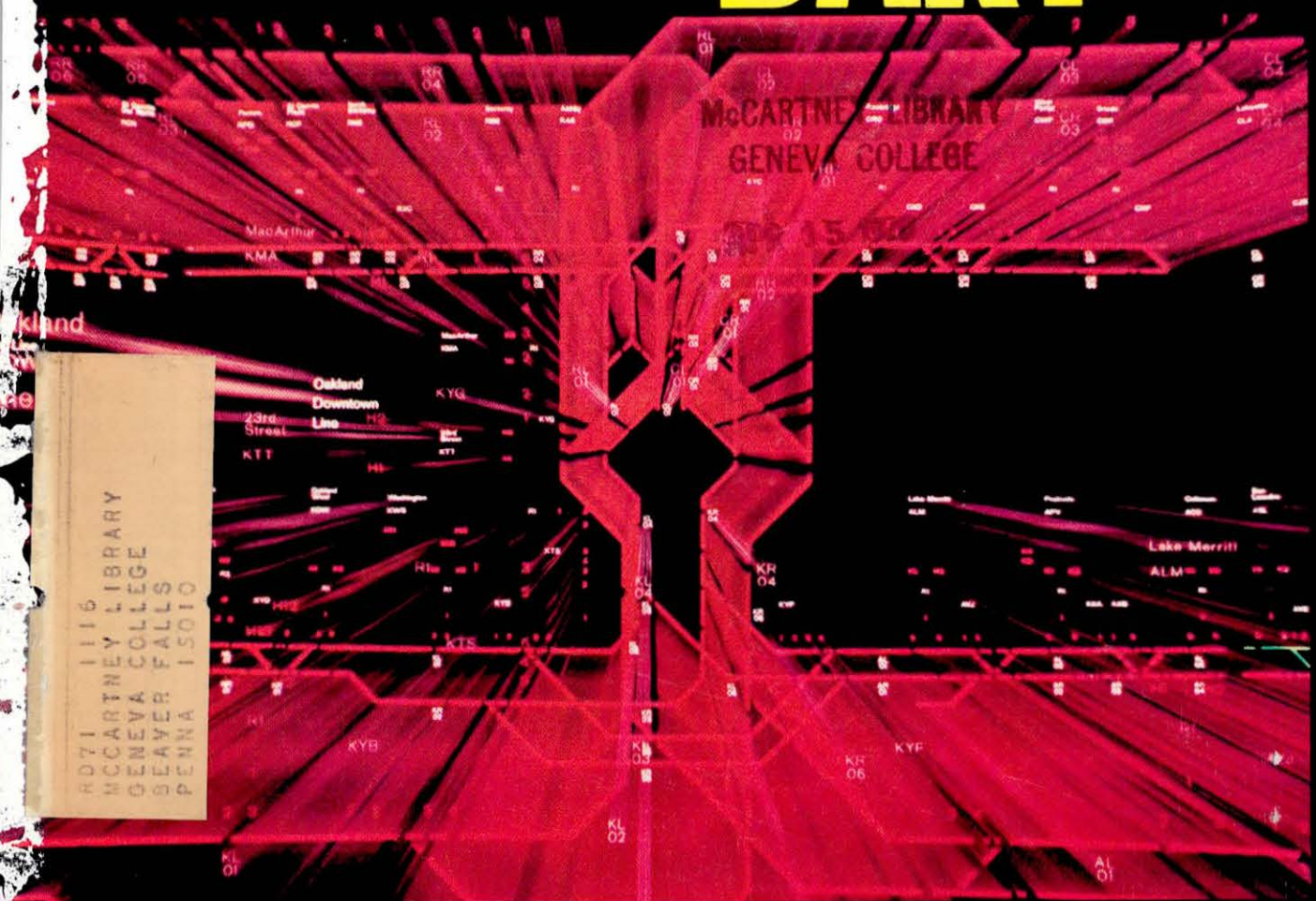
GINEERING HOW CAN TOMORROW'S TRACK NEEDS BE MET? April 13, 1970

RAILWAY AGE

The heart of BART



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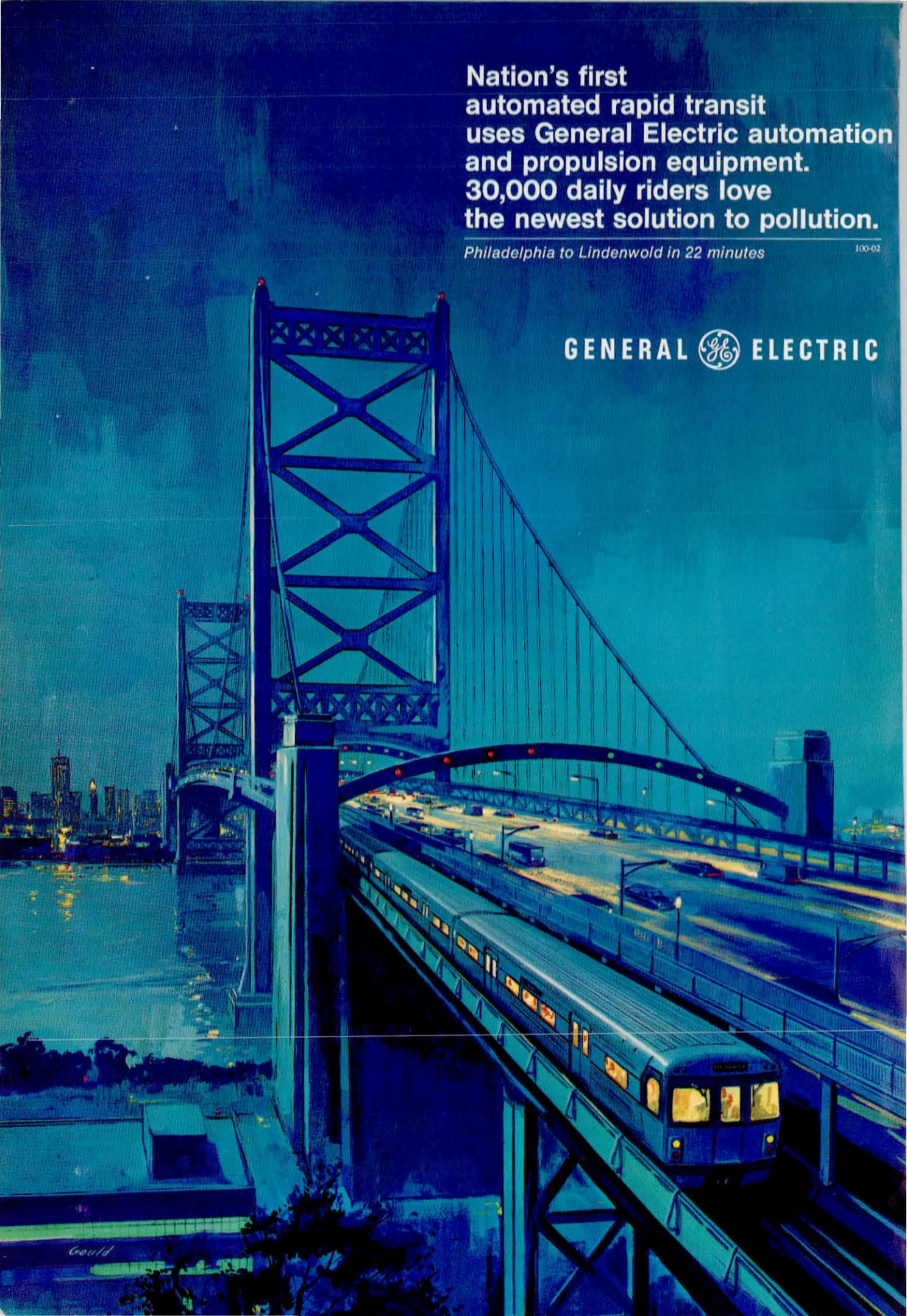
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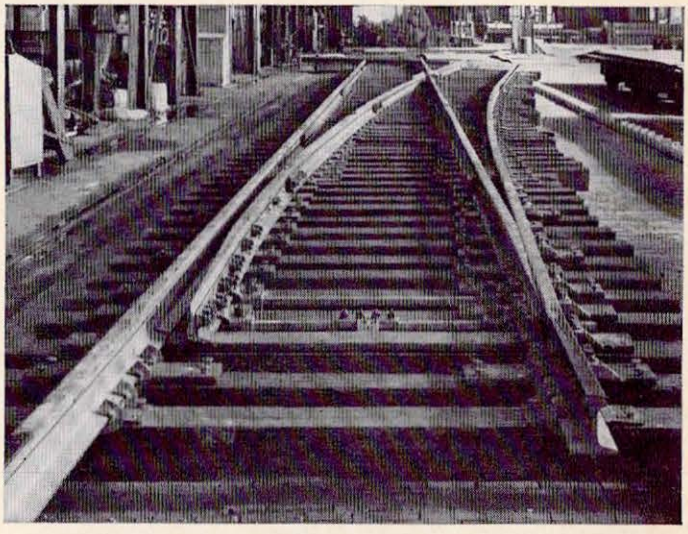
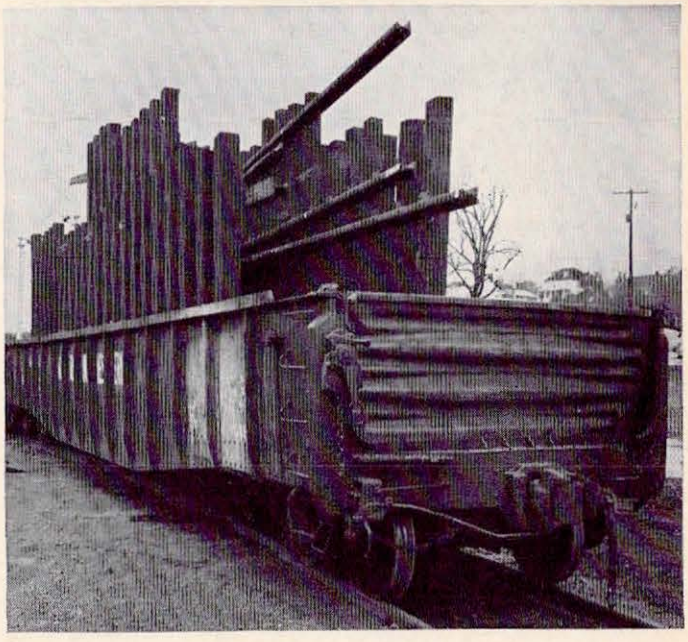


Here is a complete No. 10 turnout after final inspection on the floor of our Steelton, Pa., plant. When it's ready for shipment, we simply break it into three separate panel units to be hoisted, crossties and all, into a waiting gondola car. Our standard loading practice is two complete turnouts per car.



At the job-site, all the railroad has to do is set the assemblies in place, install the headblock ties, and complete the ballasting. The process should require less than four hours.

Bethlehem panelized turnouts are the logical outgrowth of the highly successful Bethlehem panelized switches. Both are precisely tailored to your needs, and they'll save you money and construction time. Several railroads have shown lively interest in Bethlehem panelized turnouts and switches. How about you? Bethlehem Steel Corporation, Bethlehem, Pa.

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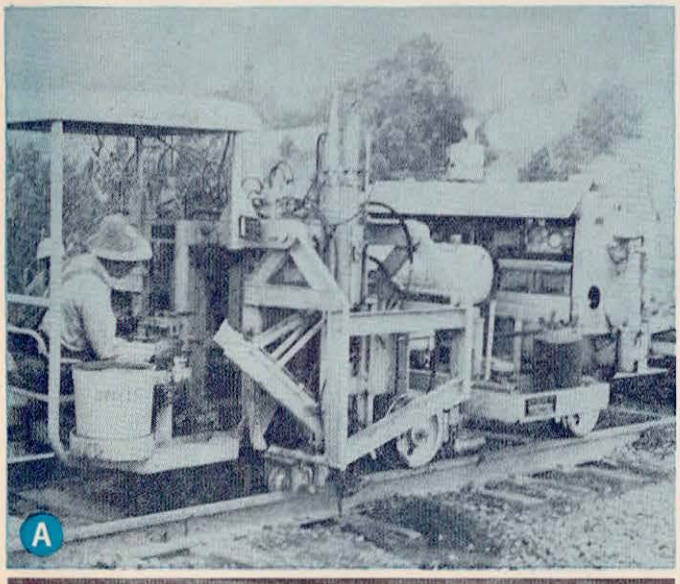

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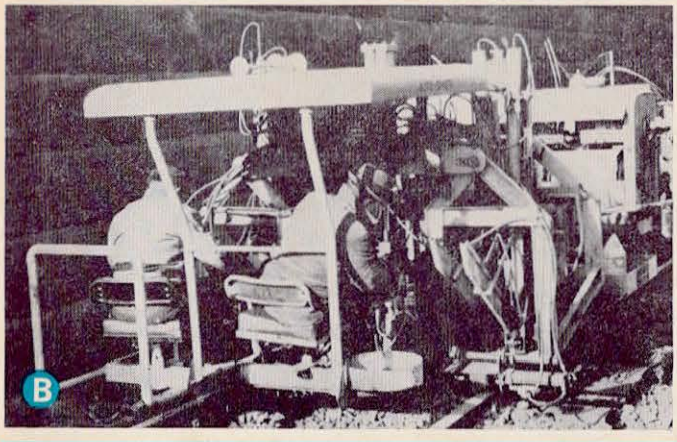

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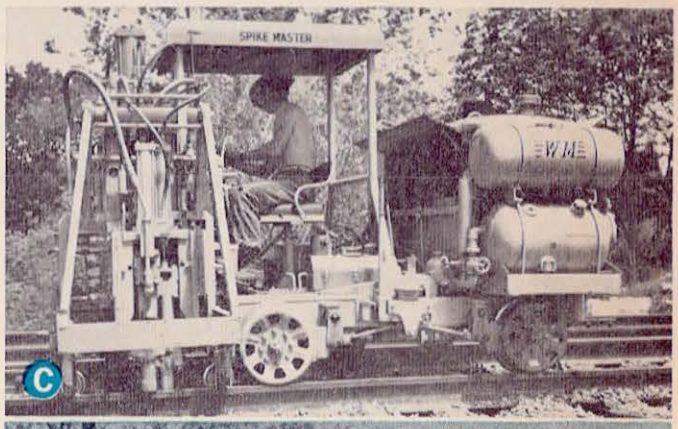

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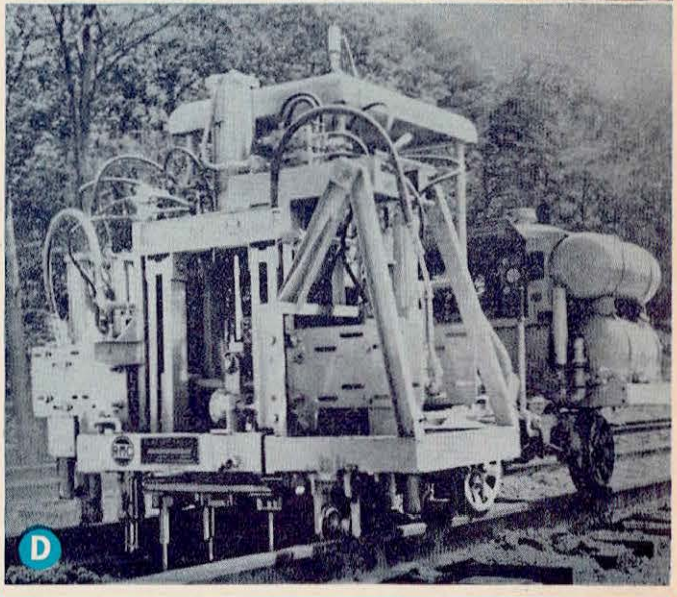

D

A. Auto-Spiker spots over tie; feeds spikes to holding positions under four spiking hammers; then drives spikes, one on each side of both rails.

B. For increased production—Auto-Spiker equipped with helper seat drives spikes at both rails simultaneously.

C. SpikeMaster nips tie firmly against the rails and drives four spikes, one on either side of both rails.

D. Two sets of nipping tongs hold tie firmly against base of rails while spikes are being driven.

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RAILWAY AGE

April 13, 1970 • Vol. 168, No. 6

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Inside

LUTHER MILLER

THERE'S A TIME TO SAVE . . .
Good publishers are good businessmen. They complain like the dickens about editors' expense accounts. Our own Bob Lewis is as good as any when it comes to watching a penny, and better than most. A $10 dinner requires 10 pages of explanation. A first-class plane ride is likely to be that editor's last—on this company's nickel.

But good publishers also have to be good editors—because they must straddle the fence that otherwise separates (as it should) the business side from the editorial side. Which explains why Bob Lewis sometimes complains more loudly about expense accounts that are too lean than about those that are too fat.

. . . A TIME TO SPEND . . .
Bob's reasoning is this: "Our job is to report the news about railroading. The news doesn't take place in an editor's office. I want our editors where it's happening. Show me an editor with a low expense account and I'll show you an editor who isn't doing his job."

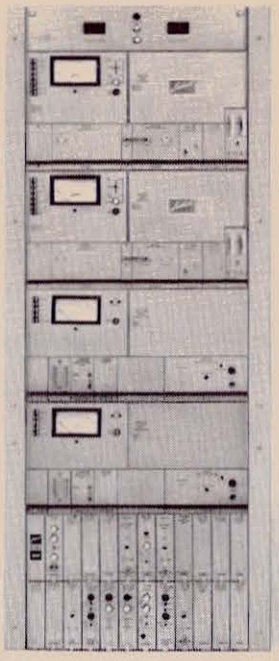
A case in point: Associate Editor Bob Bartley could have done a pretty fair job reporting on BART's new control system just by sitting in his Chicago office and cribbing from the thick and well-prepared press kit put out by Westinghouse Electric. Instead, Bob hopped on a plane to San Francisco, saw for himself what Westinghouse had to show—and then saw a lot besides. The result: A fat expense account—and a three-part story on BART which could have been written only by someone who had been there (p. 36).

. . . AND A TIME NOT TO TAKE NO FOR AN ANSWER
Money alone isn't always the answer. Contributing Editor Dave Thaler wrested a half-hour appointment with Mass. Gov. Sargent to talk about mass transport vs highways, but when Dave got to Boston the governor was sick a-bed. Dave talked to the Governor's aides—but the story he wanted had to come from the horse's mouth. So he persisted. Result: Sitting in the Governor's chair, using the Governor's phone, Dave conducted the interview via AT&T as a nurse hovered by Sargent's bedside. We think you'll agree that for a sick Governor, Sargent had some pretty healthy things to say about transportation (p. 42).

THE BEST OF TWO WORLDS
Bob Lewis will be glad to know that one story in this issue —the interview with UP Chairman Frank Barnett—entailed an expense outlay of exactly $1.20. The cost of getting two editors from our downtown New York office to UP's new uptown quarters. Appropriately enough that story is about good money management (p. 30).

A short while back, there was a lot of noise about solid-state microwave systems.

Now, there isn't.



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That means an even quieter signal.

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All in all, the new Lenkurt microwave system will make you glad you didn't rush into solid-state.

And waited for Lenkurt to quiet things down.

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RAILWAY AGE

APRIL 13, 1970

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Short and Significant

TRANSIT

WMATA WILL "BUY AMERICAN"

A policy adopted by directors of the Washington Metropolitan Transit Authority requires WMATA to buy materials and equipment from U.S. manufacturers unless items of comparable quality can be purchased abroad for 15% less. (Major efforts to sell in the U.S. come from Canada and Japan.)

TRANSIT BILL GETS NEW TEETH

As reported favorably by a Senate Banking and Commerce subcommittee, the transit-aid bill now provides contract authority for $5 billion, instead of the original $3.1 billion; and the discretionary fund available to the Secretary of Transportation has been increased to 15% of the total.

FREIGHT CARS

NEW LOOK FOR THE REEFER FLEET

Get ready to say goodbye to the ice-bunker refrigerator car—at least so far as its operation by Pacific Fruit Express is concerned. Because it has invested $365 million in mechanical reefers over the past 10 years, PFE now has 11,000 mechanical cars in its 19,000-car fleet—and is planning to phase out ice-bunker cars by the end of 1972 (though some may be retained for a while for heater and vent service).

DE-AGING THE FREIGHT-CAR FLEET

Maximum age of freight cars permitted in interchange service is to be decreased one year annually so that the present limit of 50 years will drop to 49 years on Jan. 1, 1972, and will continue to go down until it reaches 40 years on Jan. 1, 1981. The timetable for reducing the maximum age of cars eligible for interchange was proposed by the Mechanical Division of the AAR, and it was approved by letter ballot.

THE INDUSTRY

BREAKTHROUGH FOR RAIL TRUCKING?

The ICC is expected to rule in May on an examiner's report (MC-78786, sub 268) recommending unrestricted trucking rights for Pacific Motor Trucking, an SP subsidary. Examiner Bernard J. Hasan found that other motor carriers serving the area (California, Nevada, New Mexico, Arizona) were not providing adequate service.

IN CASE OF EMERGENCY . . .

Southern is distributing an "Emergency Action Plan" to all fire-fighting units along its line for use in case of accidents involving hazardous materials. The plan gives instructions for evaluating threats, if any, to persons and property, and determining methods to cope with the emergency.

P-S EYES WASTE DISPOSAL BUSINESS

Pullman-Standard has announced (1) acquisition of the Aloe Coal Co. of Imperial, Pa. (a waste-disposal company) and (2) formation of Pullman Environmental Services, Inc. Says P-S Chairman W. S. Osborne, Jr.: "Use of rail cars, trucks or containers for such disposal gives scope both for the railroad car design capabilities of Pullman-Standard and for the truck-trailer and container design facilities of Pullman's Trailmobile Division."

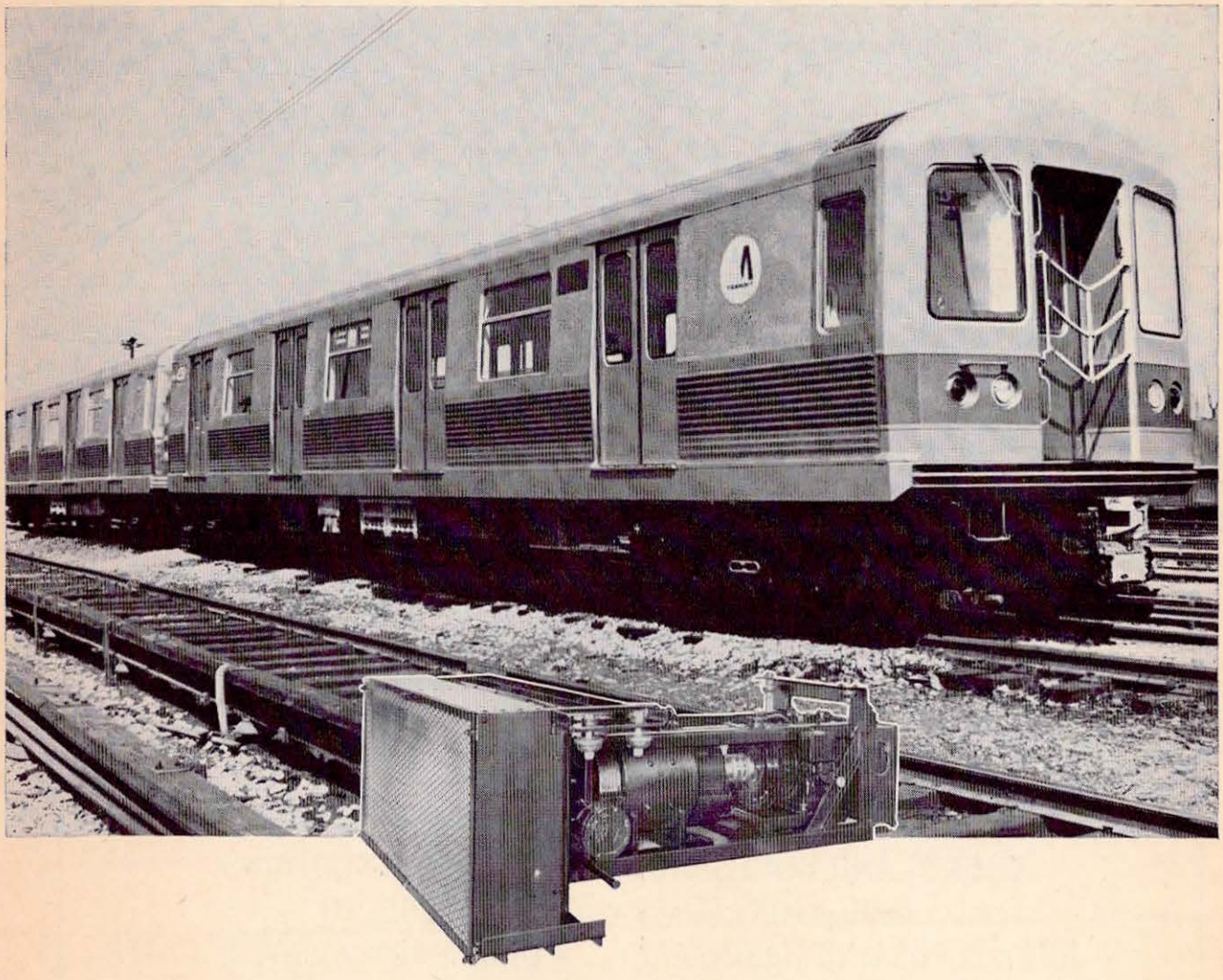
OTHER ROADS LOOK AT SP'S "TOPS"

Penn Central, Canadian National and British Railways are talking with Southern Pacific about the possibility of adopting SP's data-processing system. Early this year SP set up a new subsidiary, TOPS On-Line Services, Inc., to offer the service to any interested commercial customers.

WHY THE RATE HIKE IS VITAL

Thirty-four railroads have entered statements with the ICC in support of the industry's requested 6% freight-rate increase—and none more eloquent than those of Rock Island Chairman Jervis Langdon, Jr., and Lehigh Valley President John F. Nash. Said Langdon: Rock Island faces "a real threat to solvency, and without more revenue by mid-1970, the battle to survive may be lost." Nash said LV's net loss "is steadily increasing" and the company "could not meet its current obligations and would be forced into bankruptcy if the Penn Central Transportation Co. were to discontinue the financial support it is currently rendering."

"Safety" air conditioning: the system of the 70's



Over 600 "Safety" units keep things cool on these NYCTA cars. The component type air conditioning equipment consists of two independent systems, each rated 10-ton refrigeration capacity, which are regulated by a common temperature control unit. During operation, a mixture of filtered outside air and air recirculated from within the car is drawn into the overhead evaporator and blower units, conditioned, and diffused into the car body.

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RAILWAY AGE
NEWS

The view from the West: It's rosy

"We look ahead with a great deal of enthusiasm," said Southern Pacific President Benjamin F. Biaggini. In the next hour and a half, addressing an overflow audience of security analysts and business reporters in a private room at New York's Bankers Club, Biaggini and other top SP officers rattled off some statistics and forecasts that added up to the most bullish picture of railroading seen in the East in many a day.

As for the present: SP topped the billion-dollar mark in gross freight revenues for the first time in 1969, and had a record net income of $109 million (on the ICC accounting basis). While this year's first quarter was sluggish, and the second won't be much better, SP looks for a mid-year turn for the better. Independent surveys point to a pickup in new-auto traffic and building materials (as the money squeeze eases), along with increases in perishables (up 7%), processed food (6%), copper (17%), other mine products (6%).

And the future? In SP territory, the rate of growth of gross product originated is estimated at 4.7% by 1985, vs 4.3% for the nation. Within 15 years, gross product originated in SP territory will be equal to that of the whole country in 1950. Population growth will be at the rate of 27% in SP-land, vs 19% for the rest of the U.S.

SP has good reason to believe that all of this will translate into sharply increased traffic: Since 1960, SP has experienced a 54% growth in ton miles.

SP has high hopes for its diversification program.

The presentation by Biaggini and team was the first staged in New York by SP (which has the reputation of being a close-mouthed road). Said Biaggini: "If you want us, we'll come back, perhaps twice a year." The unanimous verdict: 'Come back." It isn't every day—or month, or year—that eastern analysts and reporters, who are so close to less happy aspects of railroading, get such a radically different view of it.

How shippers see the second quarter

Region	Actual Loadings Second Quarter 1969	Estimated Loadings Second Quarter 1970	Percent Change
Allegheny	684,583	693,979	1.4 Inc.
Atlantic States	505,410	498,214	1.4 Dec.
Central Western	241,829	252,168	4.3 Inc.
Great Lakes	564,598	549,178	2.7 Dec.
Mid-West	738,297	724,429	1.9 Dec.
New England	95,889	93,599	2.4 Dec.
Northwest	403,358	424,175	5.2 Inc.
Ohio Valley	940,507	946,732	0.7 Inc.
Pacific Coast	352,412	345,677	1.9 Dec.
Pacific Northwest	206,010	197,853	4.0 Dec.
Southeast	1,106,176	1,136,454	2.7 Inc.
Southwest	443,056	446,818	0.8 Inc.
Trans-Missouri-Kansas	353,100	374,459	6.0 Inc.
Total	6,635,225	6,683,735	0.7 Inc.
Supplemental Items	68,170	74,704	6.8 Inc.
Grand Total	6,703,395	6,758,439	0.8 Inc.

Capital spending outlook brightens

As it is now shaping up, the capital-spending picture for railroads in 1970 is not exactly dazzling—but it is considerably brighter than most published reports indicate. Well-informed sources are now estimating that railroads will invest at least as much money in capital improvements this year as they did in 1969—when the total was $1.5 billion (slightly higher than earlier, preliminary estimates). On top of this, another $300-million plus will be spent by private-car lines for a grand total that will be close to last year's $1.86 billion.

If these estimates hold up—and they are viewed as conservative—orders for new cars in 1970 will be in excess of 80,000.

(New-car orders during this year's first two months were low, totaling less than 7,000. But insiders do not view this as a trend. Their reasoning is that some roads are waiting for the cost of borrowing to go down.)

The Department of Commerce/Securities and Exchange Commission survey, just published, is considerably optimistic. This survey foresees a 26.7% increase in spending. Industry leaders with access to the spending plans of individual railroads do not view this as realistic. The Commerce/SEC survey apparently took into account the fact that in previous years railroads, at this point in time, have tended to understate their spending plans. No such understatement is apparent at this time, however.

In other areas, the year 1970 is running close to early forecasts. Traffic has flattened out, as expected First-quarter carloading were down 1.8%, although ton-miles were up 0.7%. Dollar estimates are not yet available, but little change is expected from 1969's first-quarter figures of $142 million for net operating income and $97 million for net ordinary income.

No significant change is seen for the second quarter. The 13 Regional Shippers Advisory Boards are forecasting an 0.8% increase in carloadings, which would produce a 3% increase in ton-miles. (see box). In the past, these estimates have tended to be slightly exaggerated.

Present indications are that the entire economy will experience an upturn in the second half; forecasts that railroads will do at least as well this year as last are based primarily on that expectation.

NEWS

A hero makes way for a subway

Four months after groundbreaking, signs of construction are starting to appear for Washington's new subway. The first construction site is Judiciary Square, the downtown location of the December groundbreak. There, the statue of Argentina's George Washington, Gen. Jose de San Martin, has relinquished its 45-year perch so workers can (1) shore up four surrounding court buildings, and (2) start construction of a three-fourths-mile subway segment and an underground station. Work also is under way at a site one block from the White House, where workmen must watch out for sensitive communications lines, including, it is reported, the Washington-Moscow "hot line." Seven construction contracts already are signed, says the Washington Metropolitan Area Transit Authority, for a total of $54.3 million and nearly two miles of subway. Also, two construction-related contracts, worth $1.3 million, are signed. By May 1, bids for an eighth construction contract will be taken, and specifications for Metro cars will be out. In early May, specs for train communications will go out. And in mid-May, bills will be taken for construction of sub-station equipment. WMATA says the first trains will run in mid-1973 along a six-mile line from Northeast Washington through downtown and out through Northwest Washington. That's about the time Gen. Jose de San Martin will return.

Jose de San Martin gives way to WMATA

AAR, RPI to probe tank-car safety

An analysis of tank-car mechanical failures, a study of tank-car accidents, and the formation of an accident review team are elements of a joint research program announced by Railway Progress Institute and the AAR in an effort to improve the safety of rail tank cars used to move hazardous materials.

For the first six months of the program, a total of $130,000 will be available for a strong research focus on tank-car derailments.

The program will be administered by AAR's research and test department.

Special equipment is being developed says Dr. William J. Harris, Jr., AAR research vice president, to test tank-car heads, safety valves and full tank-car models. Elements such as steel, insulation, heat resulting from fire, and shock impact from metal objects thrown up in an accident also will be studied.

Heading the project review committee will be C. E. Coyl, vice president, General American Transportation Co. Dr. Harris will be the review committee's vice chairman.

Another twist to the merger tangle

One thing can be said with certainty about the rail merger situation in western territory: It's just as complicated as it ever was, the Burlington Northern merger notwithstanding. This has been the sequence of events:

—Northwest Industries called off Chicago & North Western/Milwaukee Road merger but offered to sell C&NW rail assets to Milwaukee (RA, March 9, p. 12).

—Rock Island used this Northwest move as a basis for asking the ICC to dismiss C&NW's affirmative case for control of RI (RA, March 30, p. 14).

—C&NW officers then came forward with a plan through which North Western employees might buy the railroad (RA, March 30, p. 8).

—As expected, Milwaukee Road directors rejected the proposal that their company or a subsidiary buy C&NW. At the same time, however, Milwaukee planned to petition the ICC for inclusion in a Union Pacific/Rock Island system if that merger is approved, "or in the alternative in the Southern Pacific system, should the Commission ultimately approve the merger of the Rock Island into the UP or the disposition of part of the Rock Island" to the Southern Pacific.

Milwaukee cited a number of reasons for turning down the C&NW purchase offer. In the end, it was Milwaukee's conclusion that "unification of the two properties by acquiring only the transportation assets of the North Western would not produce enough savings to overcome . . . severe disadvantages."

As for Milwaukee's action regarding RI/UP/SP, Chairman William J. Quinn pointed out that in Milwaukee's view even a Milwaukee/C&NW merger "would in no sense be a final solution to the long-range problems of the two carriers."

Emergency aid for PC commuters

The State of New York is rushing $8,342,000 worth of first-aid to Penn Central suburban travellers. The biggest share, $7,292,000, will go for improvements on PC's Hudson and Harlem divisions, including the purchase of 50 passenger coaches from other railroads. Allocated to the New Haven division is $1,050,000. The State of Connecticut will add money to the kitty, sharing with New York the cost of improving passenger coaches and furnishing radio equipment for the New Haven service.

It's reported, meanwhile, that New York's Metropolitan Transportation Authority—which is administering the emergency program—plans to acquire 80 new coaches for the Hudson and Harlem division by 1972. Bids are already out for 144 new cars for the New Haven division (RA, March 30, p. 11).

For Chicago, one big transit network?

Chicago & North Western President Larry S. Provo is coming on strong, with a proposal that an area-wide transportation authority be established for the six-county metropolitan area of northern Illinois. What Provo has in mind is an independent agency of the state, county and Chicago governments which would have "broad authority to plan, implement and operate all the systems of mass movement in the six-county area. It would have the authority to purchase, lease, operate and contract for operation the suburban bus lines, suburban railroads, the Chicago Transit Authority system [and] include some control over those highway improvements that would have an effect on mass transportation."

Other Chicagoans agree that this might be a good idea. Provo says, for instance, that "the concept as well as the procedural steps have the support in principle of all the private suburban railroads." And, while a number of observers have talked pessimistically of the time required to set up such a system, Provo takes an optimistic slant. He calls Chicago unique: "Chicago is fortunate in that it does not have any major run-down systems. All of our suburban railroads either have modern equipment or are in the process of acquiring it. While the CTA is in need of equipment, it is also true that this largest of the mass transit agencies in Chicago also has excellent facilities." Once the authority is established, he adds, "it can acquire the various facilities at less expense than may appear at first blush. In taking over these agencies, the authority would also take over their debt, compensating each agency only for the equity it has in its operation."

Provo's proposal is based, in part, on a belief that public transit subsidies will increase substantially during the 1970s, and that private mass transit "simply cannot continue to withstand the competition of any form of urban transportation which is subsidized by public funds, either for capital improvements or to make up operating deficiencies."

For safety's sake, a systems approach

Working on the theory that safe transportation of hazardous commodities is too vital and too complex a problem to be left to splinter-solutions, the Railway Systems and Management Association is coming up with a broad-based systems approach to safety.

Part 1 of a five-part package—a chemical transportation safety index—is already available and in use. Part 2—a comprehensive handling guide for potentially hazardous commodities—was ready for review last month. Part 3—transportation safety charts—will be developed from the index and the manual. Parts 4 and 5—development of a safety education program and a central safety data bank—will come along later.

RSMA President Grant C. Vietsch compares the present safety situation to the situation facing the little boy "who asked Santa Claus for a volcano—and got it. The volcano in this case is the millions of tons of hazardous materials moving daily throughout the entire transportation matrix. Since it is patently impossible to remove these materials from the transportation system without making a shambles of our economy and our standard of living, the alternative is to find a new formula for relating man to this environment."

Vietsch's conclusion is that the only "hopeful prospect is to create a framework of information that would encompass the entire transportation safety environment."

Part 1 of the systems package—the slide-rule, pocket-size chemical safety index—includes more than 200 commodities. Each is referenced under nine factors dealing with inherent risk in the commodity, protection of life, danger and control of fire and protection of the area. The index, Vietsch points out, "is designed primarily for the man-on-the-scene. It will tell him, on a first-aid basis only, what actions to take—and what not to do."

The handling guide, covering more than 400 commodities, will be "a complete script of the procedures to be followed from the time a carrier's control center receives word of an accident through clean-up of the area." Both index and manual are designed for use by laymen.

PLASTIC TUNNEL protects workmen readying track for pouring of concrete

New transit system to get more tests

Testing in the second phase of the Transit Expressway Demonstration Project is expected to begin in June. The system, which utilizes small automatically operated rubber-tired vehicles, will be tested on a 9,340-ft loop and 1,050-ft spur at a location near Pittsburgh. The test is part of a demonstration project sponsored by the Port Authority of Allegheny County and funded by the federal government, the Pennsylvania State Department of Community Affairs, Allegheny County, and Westinghouse.

Part of the spur line is being built on a concrete slab to demonstrate that the system can be built on a highway. Westinghouse says this capability would enable the system to be used as replacements for exclusive bus lanes.

NEWS

Grain transport problem growing?

When you think about areas of the U.S. where railroads are in trouble, you tend to think East. So it may have come as a shock to Iowans recently to learn that 75% to 80% of the rail mileage in their state is being operated at substantial deficits. That's the percentage of Iowa mileage operated by Rock Island, Chicago and Northwestern and Milwaukee road—whose combined deficit in 1969 ran in the neighborhood of 30 million dollars. And that was one of the transportation problems noted at an Iowa State University grain symposium by R. I. Chairman and president Jervis Langdon, Jr., and CN&W president Larry S. Provo. The two men agreed on certain points—including the desirability of rail mergers and the desirability of concentrating grain shipping points at a limited number of rail stations. Certain specific proposals were outlined.

—Rock Island, Langdon said, "is considering a rate-basis on export corn from Iowa points to Houston which "hopefully would combine the best features of the rent-a-trains and the mini-trains."

—Langdon also called attention to the perennial railroad (and shipper) agony over car supply. Car ownership might be encouraged, he said, "if the per diem is high enough and provides financial incentive." Another possibility might be "an industry pool, or perhaps a western-line pool, organized along the lines of Trailer Train. The pool might start with general-purpose box cars and extend to jumbo hoppers. Rentals would be sufficiently high to write off the cars in 10 to 15 years and provide a good profit. Here, the crucial requirement would be ironclad central control of car distribution, so that the pool would be available to supplement car supplies generally as harvest and other peaks develop in the West and elsewhere in the country."

—Northwestern's Provo asked grain shippers to "ask the same questions we ask when we look over our rail lines. Is your elevator network in keeping with today's and tomorrow's needs? Can it be restructured into a network of fewer and larger elevators that would become centers for farm supermarkets? In South Dakota, he said, C&NW serves 171 elevators. But 80% of those elevators ship fewer than 55 cars a year, and half of the 80% shipped fewer than 17 years. Meanwhile, a South Dakota university study has indicated that 475 country elevators in the state could be replaced by 50 elevators "strategically located to serve the entire needs of the state. Each would be an integral part of a so-called farm service center with each containing elevator facilities with a throughput of at least 1 million bushels of grain per year."

—On the car-shortage problem, C&NW's president questioned whether "the answer for railroads like the Northwestern is to continue to make massive purchases of additional cars." He cited a number of problem areas including developing of incentives for return of cars from foreign lines, implementation of new clean-car rules, abandonment of light-density branch lines on which limited service contributes to poor car utilization, and changes in "archaic" systems of grain inspection

Provo was talking of car shortages, but his summation might serve for the whole problem of grain movement. Railroads cannot solve the problem alone. "We need your active cooperation, gentlemen, because every bit of progress we make . . . will be of direct benefit to you as well as to us."

Milwaukee files to drop the "Pioneer"

Citing an out-of-pocket loss of more than $500,000 last year, the Milwaukee Road is asking the ICC for permission to discontinue the overnight "Pioneer Limited" between Chicago and the Twin Cities. As it happens, the Pioneer may be unique among short-haul (421 miles), late-departure, early-arrival overnight trains: While patronage dropped lower and lower, Milwaukee continued to maintain a club car for beverage-and-breakfast service. At the time Milwaukee filed its notice-to-discontinue, however, the Pioneer consist was down to one sleeping car, a couple of coaches, a few head-end cars—and the club car. May 5 is the date set for discontinuance, barring ICC intervention.

OPENING-DAY CEREMONIES at new Metroliner station at Lanham, Md., included inauguration of feeder bus service by Greyhound Service extends to Annapolis, Maryland.

Greyhound serves Metroliner station at Lanham

Metroliner passengers living in the area between Annapolis and the new Metroliner station at Lanham, Md., will be able to leave the driving to Greyhound.

The bus company is providing feeder service for local neighborhoods to the new station, 10 miles east of Washington, D.C. Feeder bus service between the station and Bethesda and Silver Spring, Md., will be provided by D.C. Transit.

The station is used daily by three Metroliners and four conventional trains each way.

Among those attending the opening-day ceremonies were (from the left, photo above) Van Middleton, a vice president for Greyhound Lines-East; Charles Webb, president, National Association of Motor Bus Operators; Reginald Whitman, Federal Railroad Administrator; John Volpe, Secretary of Transportation; and Myles Mitchell, director-Office of High Speed Ground Transportation.

Supplemental pension bill becomes law

President Nixon has signed a compromise supplemental-pension bill covering railroad employees—but he got the legislation on his desk only after a battle in Congress which reflected a deep split in rail labor's own ranks.

A key issue—and a key difference between House and Senate versions of the annuity bill—was compulsory retirement. House and Senate conferees compromised their differences. The final bill provides for a gradual scaling-down of retirement age, with penalties for men who choose working. For example, employees who are 68 before the end of 1970 must retire on or before Jan. 31, 1971, or forfeit the entire supplemental annuity. Under the scale-down plan, after Dec. 31, 1973, all employees must retire before the last day of the month after the month in which they reach age 65, or forfeit the entire supplemental pension.

Rail unions tended to interpret the compromise in terms of their original positions. The United Transportation Union, which supported retirement at 65, told its members—by quoting House Interstate and Foreign Commerce Committee Chairman Harley O. Staggers—that the bill "will in the long run encourage many employees to refought compulsory retirement, put tire voluntarily at age 65."

Fishwick is named president of N&W

John P. Fishwick last week was named president and chief executive officer of the Norfolk & Western. Fishwick, who has been an N&W senior vice-president, succeeds Herman H. Pevler, who is retiring. The N&W board of directors also appointed Robert B. Clator, a senior vice-president, as executive vice-president, a new position. Pevler, who is 67 years old, will remain a director of the company and chairman of the board. Fishwick, a native of Roanoke, Va., has been an N&W senior vice-president since 1963.

Lines on Labor

GUS WELTY

WHAT'S HAPPENING TO UNIONISM?

Labor unions in the United States have a lot to be proud of. At this point in history, they may also have a lot to be afraid of. It can't be said with any certainty, yet, that union movement's best days are behind it. But strange and potentially powerful forces are at work today. Management is becoming less cowardly in the face of union demands. Government is becoming increasingly irritated as it becomes increasingly involved in labor disputes. Organized labor itself is faced with internal problems which may be even more serious than those facing it on the outside.

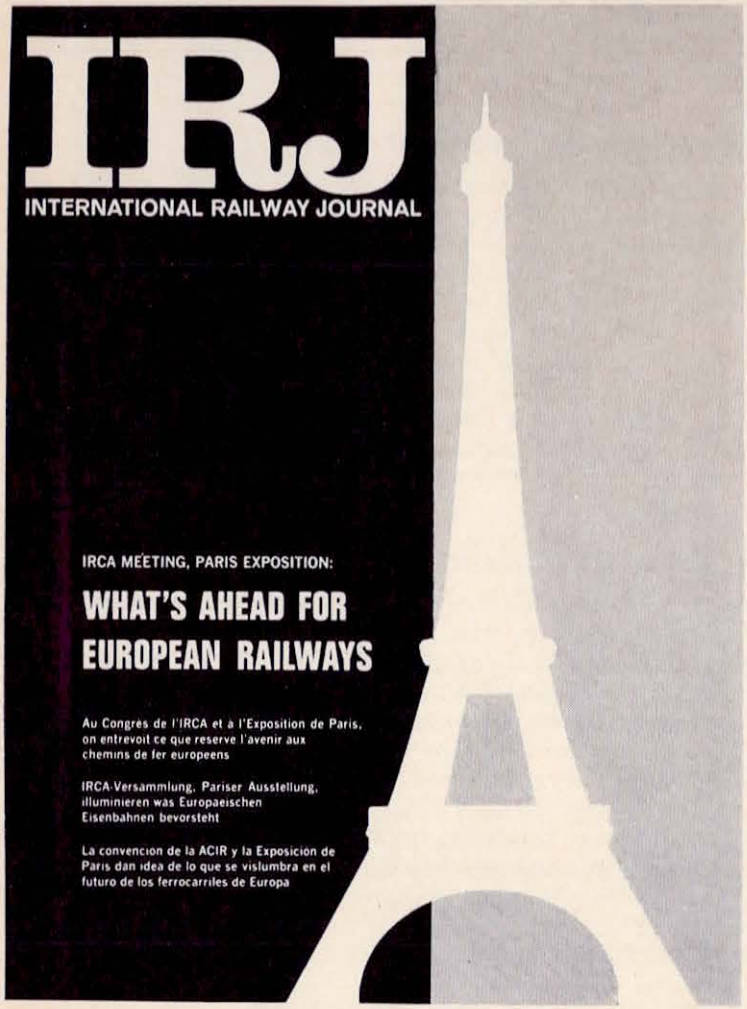
NEW ROLES FOR MANAGEMENT AND GOVERNMENT

By and large, management is still quite a ways from achieving a position of equality with labor in the power struggle called "bargaining." But management is trying. If organized labor was listening, it heard something ominous in rail management's declaration of independence in the shopcraft case, and that's just one "for instance" that might be cited. Then, too, labor has good reason to keep an ear tuned to Washington. Government is having its own labor troubles, and quite possibly these troubles are producing new attitudes toward unions and toward the bargaining process. Quite possibly, the nation's elected representatives may re-do the arithemetic and conclude that 17 million union members are not really a ruling majority in a country of 200-million-plus.

INSIDE LABOR, PROBLEMS ARE BUILDING UP

Internally, many unions have more problems than enough. Aging leadership is one. Rebellion in the ranks is another. The old discipline is breaking down. The union, like the government, has been based on representative democracy. Now, the demand is for participatory democracy. Individual members want the right to veto settlements made by their negotiators. Individual members and junior officers have it in their power to blow the lid off. Their mood, unfortunately, may lead them to say "Let 'er blow—and hang the consequences." Then you can carry this cult of the individual a step further, to so-called "individual action"—which means that if a strike is illegal or otherwise not to be permitted, the individual (with or without the tacit approval of his union) marks off sick and defies anybody to do anything about it. Sheet metal workers vote-down their negotiators. Letter carriers shout-down their leaders. An epidemic sweeps through the ranks of air traffic controllers. And where does it all end? It ends, inevitably, with repression. It has been said before, but it bears repeating: Forced to choose between chaos and compulsion, society will choose compulsion.

TELL THE WORLD IN 'IRJ'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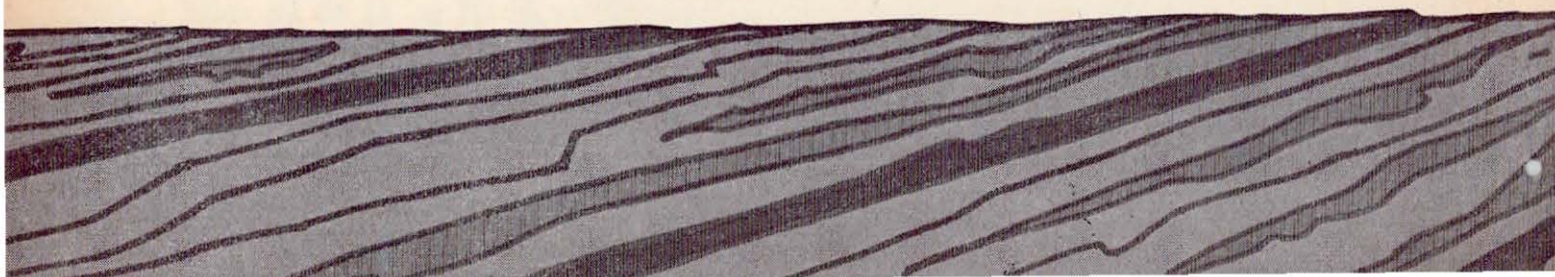

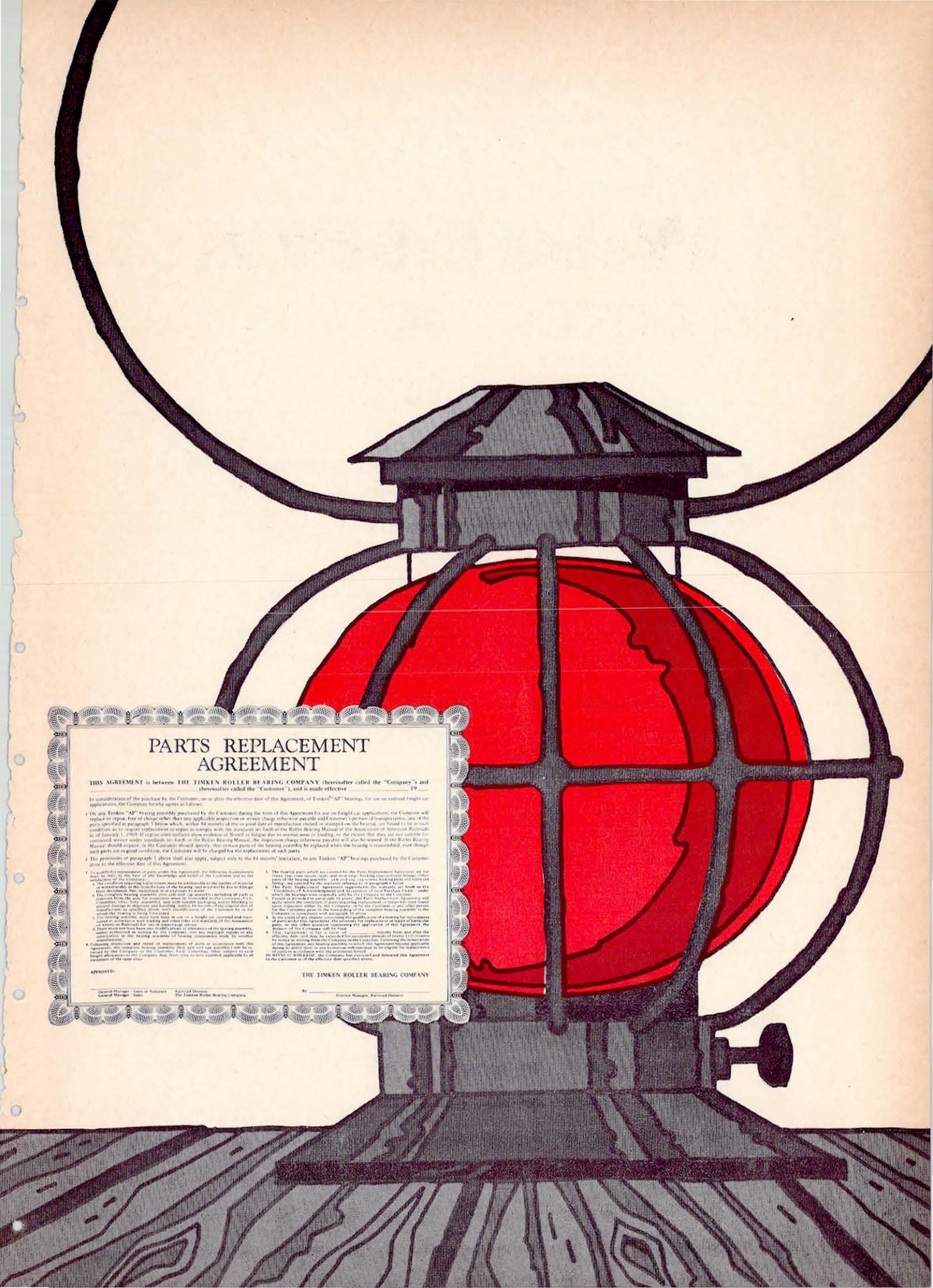

PARTS REPLACEMENT AGREEMENT

THIS AGREEMENT is between THE TIMKEN ROLLER BEARING COMPANY (hereinafter called the "Company") and _____ (hereinafter called the "Customer"), and is made effective _____ 19__.

In consideration of the purchase by the Customer, on or after the effective date of the Agreement, of Timken "AP" bearings, for use on railroad freight car applications, the Company hereby agrees as follows:

1. On any Timken "AP" bearing assembly purchased by the Customer during the term of this Agreement for use on freight car applications, the Company will replace or repair, free of charge other than any applicable inspection or service charge otherwise payable and Customer's portion of transportation, any of the parts specified in paragraph 3 below which, within 84 months of the original date of manufacture etched or stamped on the bearing, are found to be in such condition as to require replacement or repair to comply with the standards set forth in the Roller Bearing Manual of the Association of American Railroads as of January 1, 1969. If cup or cone surfaces show evidence of brinell or fatigue due to normal wear in loading, to the extent that they are not suitable for continued service under standards set forth in the Roller Bearing Manual, the inspection charge otherwise payable will also be waived. If the Roller Bearing Manual should require, or the Customer should specify, that certain parts of the bearing assembly be replaced when the bearing is reassembled, even though such parts are in good condition, the Customer will be charged for the replacement of such parts.

2. The provisions of paragraph 1 above shall also apply, subject only to the 84 months' limitation, to any Timken "AP" bearings purchased by the Customer prior to the effective date of this Agreement.

3. To qualify for replacement of parts under this Agreement, the following requirements must be met, to the best of the knowledge and belief of the Customer and to the satisfaction of the Company:
   a. The condition requiring replacement must be attributable to the quality of material or workmanship in the manufacture of the bearing, and must not be due to damage from derailment, fire, overheat or an explosive device.
   b. The complete bearing assembly (inner side and cap assembly) including all parts to be removed from the axle for inspection must be forwarded to the Company, Tech, Columbus, Ohio, fully assembled, and with suitable packaging and/or blocking to prevent damage in shipment and handling, within 84 months of the original date of manufacture, as specified above, such identification of the 3 numbers to be on the wheels the bearing is being forwarded.
   c. The bearing must have been applied in use on a freight car operated and maintained in accordance with loading and other rules and standards of the Association of American Railroads for cars in interchange service.
   d. There must not have been any modifications or alterations of the bearing assembly, unless authorized in writing by the Company, nor any improper repairs or any substitution in the bearing assembly of bearing components made by another manufacturer.

4. Following inspection and refusal or replacement of parts in accordance with this Agreement, the complete bearing assembly (less axle and cap assembly) will be returned by the Company to the Customer, Tech, Columbus, Ohio, subject to such freight allowances as the Company may from time to time establish applicable to all shipments of the same class.

5. The bearing parts which are covered by this Parts Replacement Agreement are the cones, cup, cone spacer, seals, seal wear rings, locking ring and seal springs. Other parts of the bearing assembly, such as end cap, cup screws, locking plate or lubricant will be furnished by the Company only as provided in paragraph 6 below.

6. This Parts Replacement Agreement supplements the warranty set forth in the "Conditions of Acknowledgment and Acceptance of your Purchase Order," under which the bearings were originally sold by the Company to the Customer.

7. Except as provided in paragraph 4d above, this Parts Replacement Agreement will apply where the condition of parts requiring replacement or repair has been found upon inspection either by the Company, or by the Customer or any other person for the Customer prior to the forwarding of the complete bearing assembly to the Company in accordance with paragraph 3b above.

8. The Company may terminate its obligation to accept claims for replacement of parts under this Agreement, the method for replacement or repair of particular parts, or any other question concerning the application of this Agreement, the decision of the Company will be final.

9. This Agreement is for a term of _____ months from and after the effective date, and may be extended for successive periods of twelve (12) months by notice in writing from the Company to the Customer. Following the termination of this Agreement, any bearing assembly to which this Agreement became applicable during its initial term or any extension will continue to be eligible for replacement of parts in accordance with the provisions hereof.

IN WITNESS WHEREOF, the Company has executed and delivered this Agreement to the Customer as of the effective date specified above.

APPROVED:

_____
General Manager – Sales or Assistant General Manager – Sales
Railroad Division
The Timken Roller Bearing Company

THE TIMKEN ROLLER BEARING COMPANY

By _____
District Manager, Railroad Division

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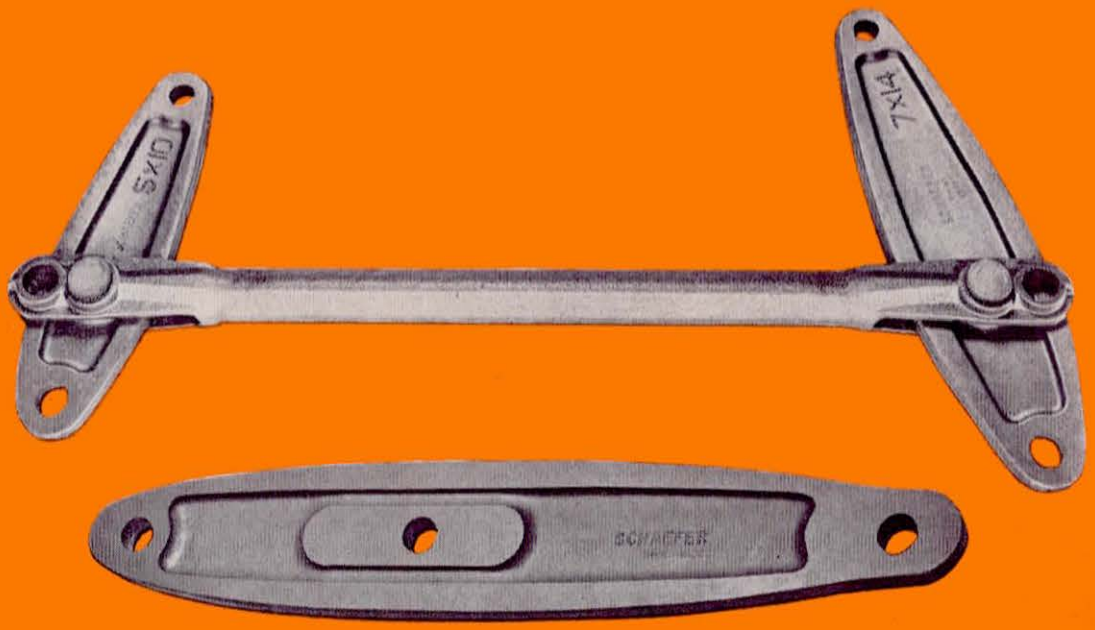

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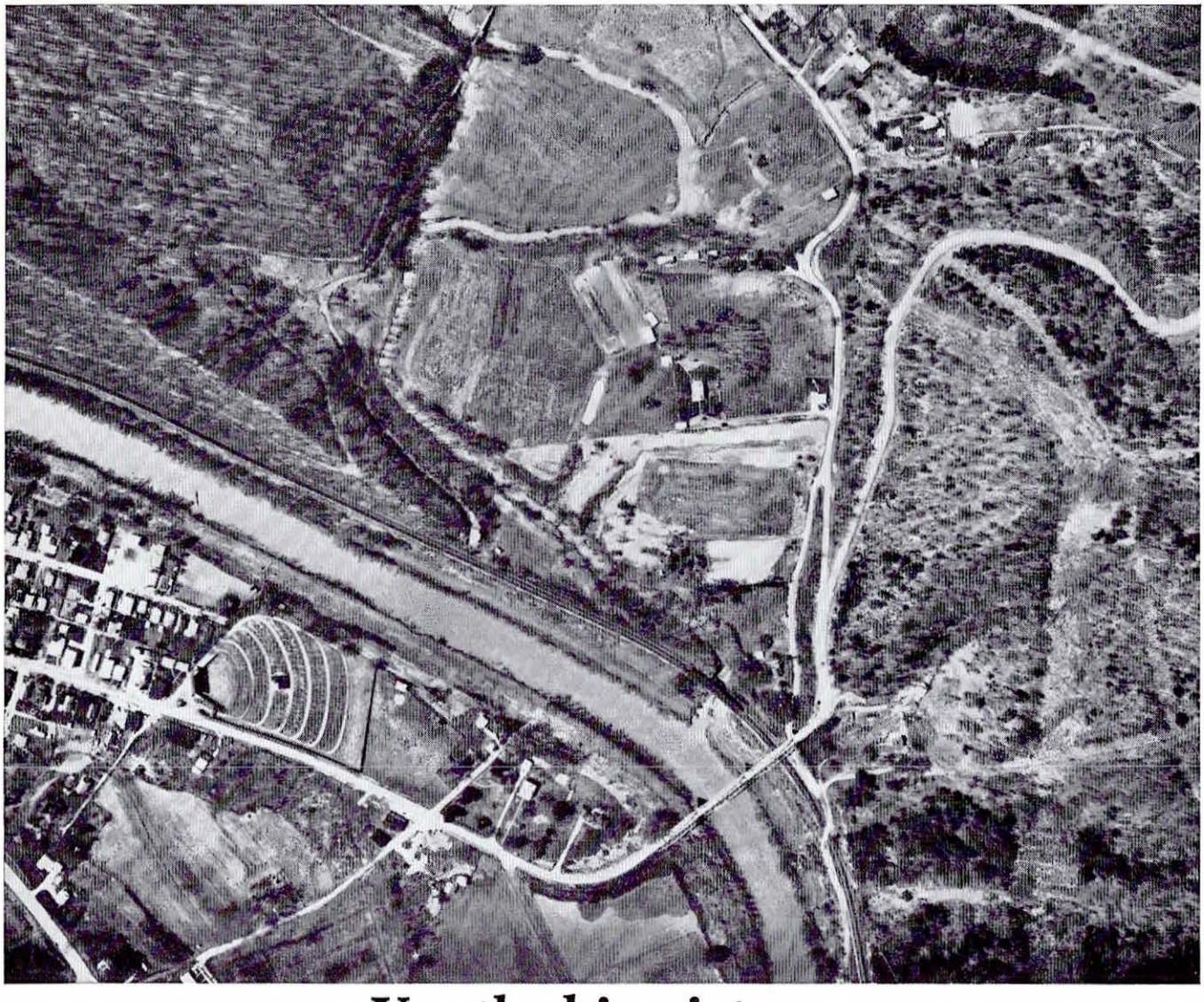

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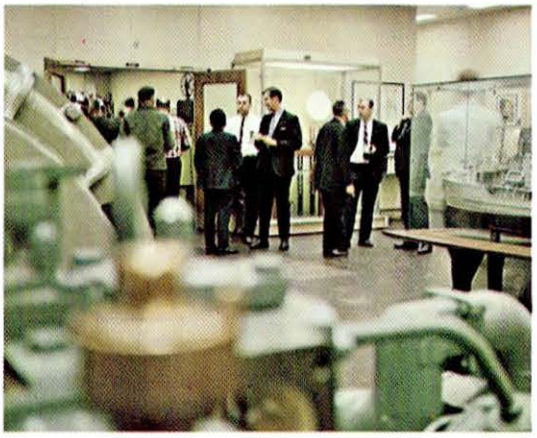

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After all, we've been making trainers for the aviation industry since the 1930's. We figured it was time we made a train trainer.

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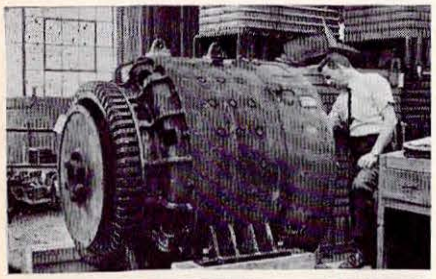
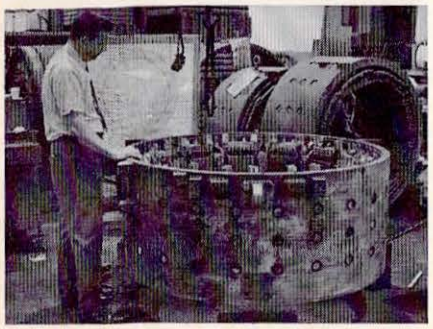
Circle 12 on coupon page 69

Charles Hulls can give you a universal generator that fits any locomotive, and reduces your inventory.





Above: A D-12 generator prior to conversion. Below: D-32 stator during rewinding. Note mounting lugs, adaptable to any locomotive.

Railways are finding National's generator-conversion plan a big time-and-money saver in meeting the need for more power for traction motors. We remanufacture EMD D-12 generators – convert them to D-32 design to give you optimum power in frame mountings that *fit any locomotive.* This works two ways: (1) We convert *your* D-12 to modern D-32 design, or (2) we sell you a D-32 from our unit exchange stock—and ship immediately. Either way, you get the unmatched quality of National designs, materials and workmanship, you make substantial time and dollar savings over new epuipment, and you get a generator that mounts on any EMD locomotive. *It reduces inventory.*

Many pluses account for the long, trouble-free life of National remanufactured traction generators. For example: After field coils and bars are assembled in the pole pieces, they are vacuum-pressure impregnated with an epoxy resin. Then, after installation in the frame, the entire field structure is dipped in varnish, making it highly resistant to moisture.

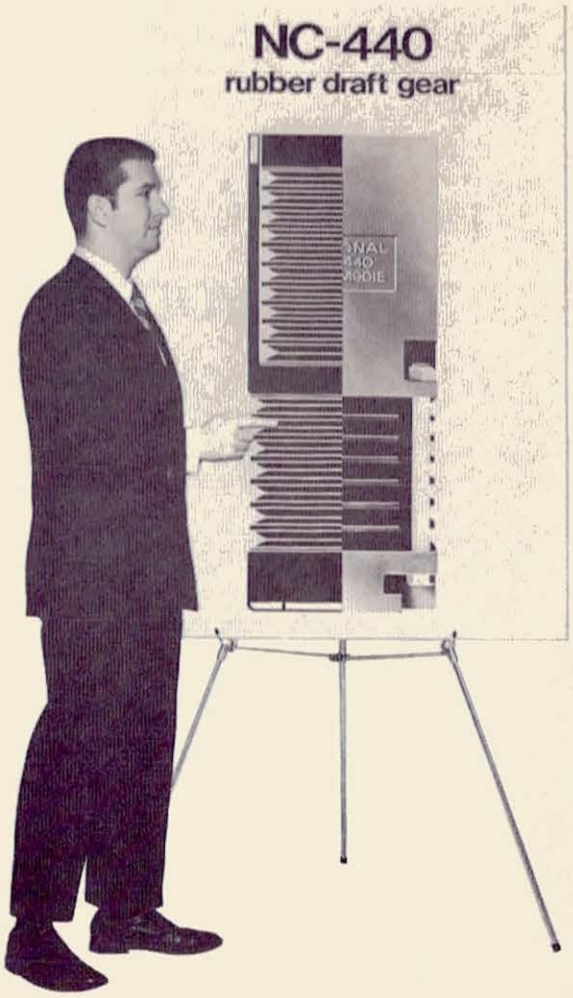
Charles Hulls, our Railway Coordinator, is backed by an experienced team of engineers and craftsmen assigned to the D-12 to D-32 conversion program. For full information, dial him today at 614/488-1151. National Electric Coil, Columbus, Ohio 43216.

DIVISION OF McGRAW-EDISON

You get a lot more than copper in a* National Electric Coil *job.

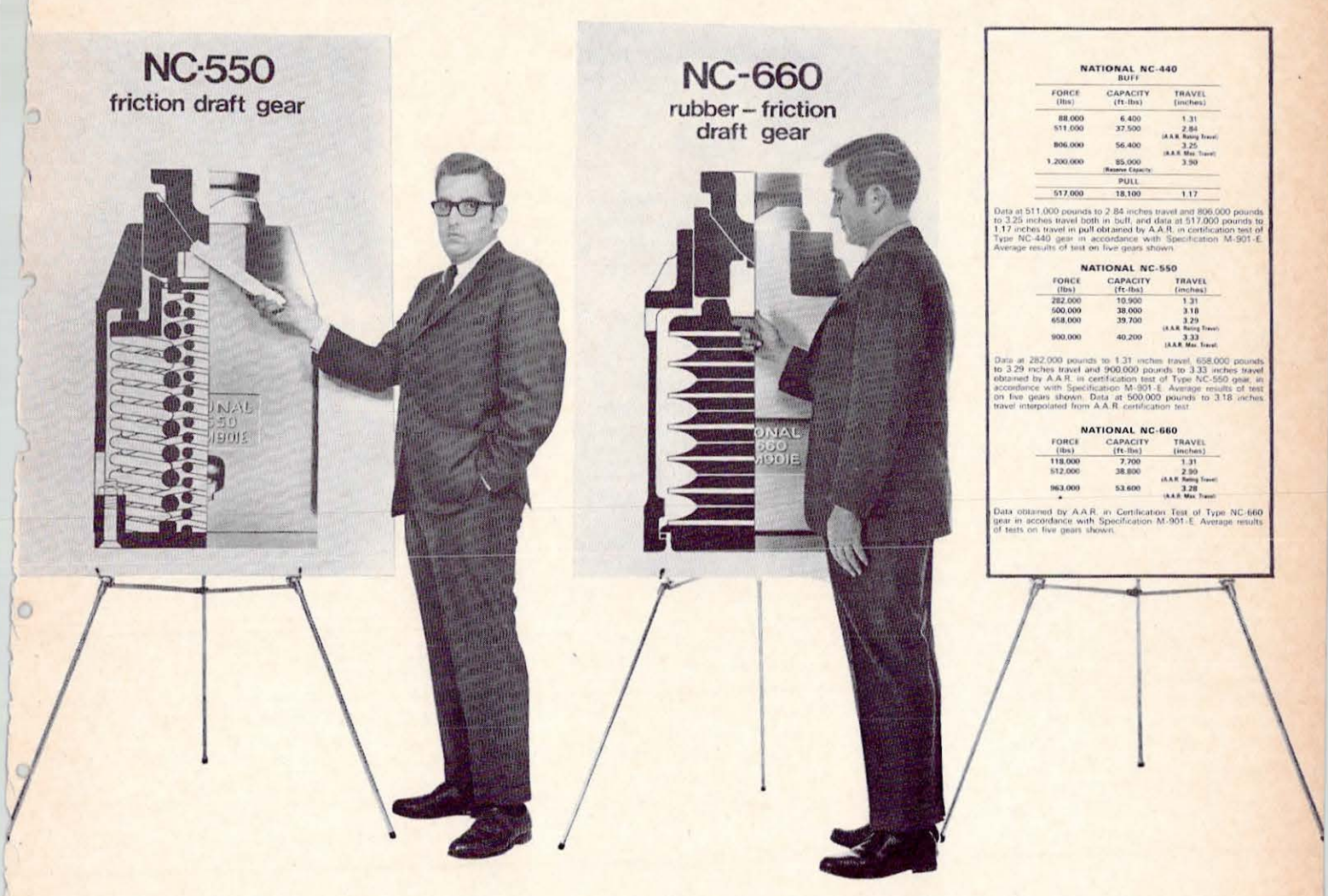
Circle 13 on coupon page 69

What do you want in a Draft Gear?



National now has a design for every type of M-901-E service

Walter Dahl says: "The heavyweight among the M-901-E gears is the National NC-440 because it provides full cushioning power of rubber for greatest protection at high impacting speeds. It can withstand impact forces up to 1.25 million pounds and still provide cushioning. NC-440 develops substantial reserve capacity beyond AAR rating travel and AAR maximum travel. Dynamic capacity of rubber pads actually increases with speed of load application. No other gear can match it, particularly for today's large cars and higher impact speeds."



NATIONAL NC-440
BUFF

FORCE (lbs)	CAPACITY (ft-lbs)	TRAVEL (inches)
88,000	6,400	1.31
511,000	37,500	2.84 (A.A.R. Rating Travel)
806,000	56,400	3.25 (A.A.R. Max. Travel)
1,200,000	85,000 Reserve Capacity	3.90
	PULL	
517,000	18,100	1.17

Data at 511,000 pounds to 2.84 inches travel and 806,000 pounds to 3.25 inches travel both in buff, and data at 517,000 pounds to 1.17 inches travel in pull obtained by A.A.R. in certification test of Type NC-440 gear in accordance with Specification M-901-E. Average results of test on five gears shown.

NATIONAL NC-550

FORCE (lbs)	CAPACITY (ft-lbs)	TRAVEL (inches)
282,000	10,900	1.31
500,000	38,000	3.18
658,000	39,700	3.29 (A.A.R. Rating Travel)
900,000	40,200	3.33 (A.A.R. Max. Travel)

Data at 282,000 pounds to 1.31 inches travel, 658,000 pounds to 3.29 inches travel and 900,000 pounds to 3.33 inches travel obtained by A.A.R. in certification test of Type NC-550 gear, in accordance with Specification M-901-E. Average results of test on five gears shown. Data at 500,000 pounds to 3.18 inches travel interpolated from A.A.R. certification test.

NATIONAL NC-660

FORCE (lbs)	CAPACITY (ft-lbs)	TRAVEL (inches)
118,000	7,700	1.31
512,000	38,800	2.90 (A.A.R. Rating Travel)
963,000	53,600	3.28 (A.A.R. Max. Travel)

Data obtained by A.A.R. in Certification Test of Type NC-660 gear in accordance with Specification M-901-E. Average results of tests on five gears shown.

Ken Pankey says: "National has many good gears. But some railroads prefer the NC-550 Friction Gear because it can be used to replace any other M-901-E gear. This is a boon in special situations where rubber may not always be the only answer. The improved 3-shoe friction clutch, with steels of special hardness ratios, gives high capacity with minimum wear. Another great feature is the self-adjusting mechanism which equalizes bearing loads on all friction surfaces so as to prevent sticking during gear release."

Hayden Miller says: "National's new NC-660 Gear is a winner. Some like rubber, some prefer friction. But with the NC-660 you can have your cake and eat it, too. The NC-660 combines advantages of both the NC-440 and the NC-550. And you get a full 6½" of travel — 3¼" each way in buff and pull. It's a snap to install, too, since it's delivered with preshortening blocks that fall out on the first impact. Long life. High capacity. Minimum wear. Easy installation. What more could anyone ask of any gear . . . or of National?"

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TOMORROW'S RAILROADS IN ACTION: MONEY MANAGEMENT

"In Action" is the operative phrase in the continuing Railway Age series, "Tomorrow's Railroads in Action."

Through the first quarter of 1970, the series has looked at the developing railway market . . . at innovations aimed at improving service to shippers . . . at action programs to make the fixed plant better perform its vital functions.

TRIA has explored the minitrain concept . . . the pentrations of a new freight-traffic market . . . the promotion of rail freight services. TRIA has looked at improvements in motive-power management . . . at new procedures in improving car distribution and utilization . . . at today's operating-department philosophies which put service first. TRIA has studied the new look in track and roadway improvement. TRIA has probed the railroad role in the care and preservation of the environment.

If there is a common denominator to these TRIA explorations and the ones which will follow in 1970, it could be summed up in a word: Money.

It isn't so much that with money all things are possible. It's more that without money, and the careful management of money, few things are possible.

The railroad industry's money-managers are seldom headline-makers. But a good part of the industry's present and future rides on their performance—whether it be in planning of capital needs or in cash management or in day-to-day material purchases and distribution.

In this issue, TRIA looks at all these aspects of what must rank as one of the industry's most complicated, least understood and most vital jobs: Money management.

To size up the present capital-investment situation—and its implications for tomorrow—Railway Age's Luther Miller and Joe Kizzia talked with Union Pacific Chairman Frank Barnett in New York. For the other half of the story—materials management—Washington Editor Frank Malone visited the Norfolk & Western at Roanoke, Va. (p. 33).

Can we build tomorrow's

UP Chairman Frank Barnett discusses the factors that influence capital-investment decisions: traffic levels, per-diem rates, freight rates, wages, the high cost of borrowing, the passenger-loss burden—and possible new government incentives.

Q. Mr. Barnett, you said recently that you were reappraising your capital investment program for 1970. What does this reappraisal involve?

A. We originally budgeted $166 million. First, as a general rule when the business outlook is uncertain we always continue to reappraise our capital investment program. Secondly, insofar as freight-car equipment is concerned, we want to know how the per-diem problem is going to be resolved. We're not in the business of leasing or renting freight-car equipment to other railroads, and we don't propose to buy it for that purpose. If the ICC or the Congress comes up with a true incentive arrangement which will increase the use of freight-car equipment, and get our equipment back to us from the hands of principally eastern lines, that would be a plus factor in our reconsideration of our 1970 program.

Our own equipment program would be given a considerable boost if the ICC could find it somehow possible to arrive at a decision in the Rock Island case. We have a major undertaking to supply the Rock Island with equipment that it badly needs. To a limited degree we can lease equipment to the Rock Island. Beyond that we are immobilized until the ICC decision comes out.

Q. What would be an equitable per-diem plan, in your view?

A. The railroads themselves had a task force working on this problem for several years including representatives of some of the eastern roads. The task force suggestion has been incorporated in Senator Magnuson's bill, S. 3223. That bill provides for straight per diem which includes a reasonable return on the owning road's investment in freight cars. It eliminates the so-called mileage factor which would operate as anything but an incentive for the use of railroad freight cars. We hope the Magnuson bill can be passed and provide a straight per-diem rate based on time only.

Q. Orders for new freight cars fell to slightly more than 2,000 in January. Is the high cost of money one of the factors causing the present slowdown in spending?

A. The high cost of money has a great deal to do with it, in addition to the factors that I've already mentioned. But there is one factor that is more important than the high cost of money—and that is the sheer non-availability of money to some railroads.

Q. Can a comparatively well-off company such as the Union Pacific base its capital spending decisions principally on need—or is the availability of money a restraining factor?

A. In our case, fortunately, capital investment has not been restrained by the availability of funds We have funds available to buy any equipment which we think is needed and on which we can get a reasonable return. But for many railroads this is not true

Q. How do you finance your equipment acquisitions?

A. You can't answer that question without looking at the period involved. I can't say that a certain percent comes from depreciation accruals, and another percent from retained earnings, or another percent from borrowing, because it depends on the period you look at. Our depreciation and depletion will amount to around $80 million for the year 1970. That of course provides us with some cash but nowhere near what is necessary or desirable An increasing amount probably will have to come from borrowing

Q. You mentioned incentive per-diem as one way to encourage equipment acquisitions by railroads such as your own. What other incentives can government provide that it is not now providing?

A. Certainly, the five-year equipment amortization provided in the Tax Reform Bill is helpful There isn't any question about that The government, in order to be additionally helpful, could insure the continuance of the five-year amortization. They could go even further and provide an entirely optional method of writing off equipment, as

lroads with today's money?

everal enlightened countries have done. They could also authorize revenue levels which would provide the money necessary to make the required investment in railroad equipment, which should be on a level of a minimum of $2 billion a year, but hasn't been there for years.

I don't think a direct subsidy would be desirable. All we're really looking for from government, since the government has control of our rates, is a reasonable rate level and perhaps some cessation of the subsidization of our competitors. In other words, if they'd let us alone we'd be very happy. A large part of the economic philosophy of our country is based on competition, and we're one of the few industries prevented by law from competing to the extent that we could.

Q. Has the loss of the 7% investment tax credit had any effect on your equipment acquisition plans?

A. It has made us somewhat less enthusiastic.

Q. DOT Under Secretary James Beggs suggested in a recent interview with Railway Age that quite beyond the passenger problem, the railroads may need some kind of federal "involvement" in freight service. Have you any comments?

A. When Mr Beggs talks about government "involvement" in freight service, I don't know what he's talking about. We don't want the federal government "involved" in freight service, in any way, shape or form. If they would eliminate their present involvement, it would be very helpful.

If I sound cynical about governmental involvement in freight service, it is because I am. I don't think they know how to become involved in the first place. In the second place, I don't think they have the slightest appreciation of the problems invloved, which is illustrated by the only thing that they have so far proposed to do in the passenger service —that is, to devote financial peanuts to solving a massive problem.

Q. Just what is the status of Railpax? Is it in limbo?

A. It's in limbo. Meanwhile, the Congress has been working on its own "solution." This has some of the earmarks of an election-year charade.

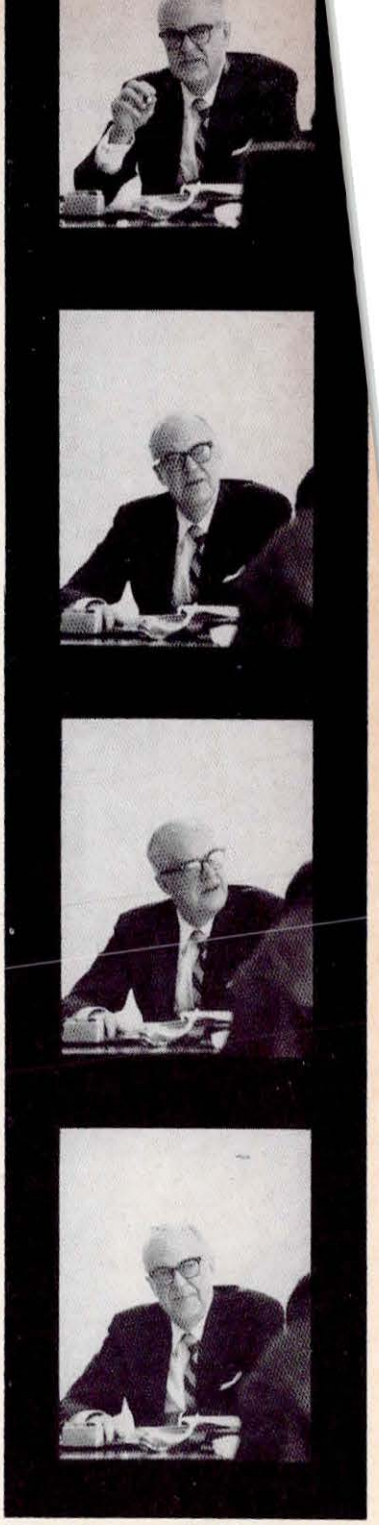
Q. What are your own feelings about passenger service?

A. In the first place, there's one astounding fact we find when we first began looking at this problem, and that is that there is not in existence such a thing as a market study for rail passenger transportation. There may be a market in certain areas, but nobody really knows. For example, is there a market for overnight rail transportation between New York and Chicago? The railroads are acting on the premise that there isn't. They may be right. They may be wrong. But there should be a market study—we have the talent to do it and we know how to do it. But it's everybody's problem so it's nobody's problem.

If you take the air routes and put them on one map and then take the superhighway system and superimpose it on transparent overlay on top of the first one, and then superimpose on that a map of rail passenger service, you will find that there are about 30 heavily traveled corridors in the United States. We all know about the one between Washington and Boston. There are others between New York and Miami, between Chicago and New Orleans and Miami, between Los Angeles and San Francisco, between Portland and Seattle.

I don't propose by any means that this is another subject which the Federal government should take up and study to death. We ought to provide by law that this kind of study must be completed in the period of six months, with nobody getting paid after that time.

Simultaneously we should have another well-financed study on the mechanical side. There are about five systems of carrying passengers by rail today that have not only been developed engineering-wise but have been tested. France's tracked air-cushion-vehicle tests, for example. We should decide on the one or possibly two systems that are most feasible. Then, with these two studies completed, if Congress still feels they should be involved in supplying rail passenger service, they will have to supply a massive injection of capital to do exactly that. But in the meantime, Railpax in its present form is not the answer.



"In addition to the high cost of money, there is the sheer non-availability of money to some railroads. [But] I remain optimistic about the longer term. . ."

Frank Barnett

Q. You were very active in Washington last fall when the fate of the 7% investment tax credit was being decided,

and you were a key man in the talks which led to the railroads' getting, as a substitute, the 5-year amortization for rolling stock. Have we stopped with the Tax Reform Bill? Is there any hope of getting anything better?

A. There's one very important question still outstanding. The railroads for some time have been trying to get the right to amortize the cost of grading and tunnel bores. We get no deductions at the moment. The rail industry has a combined investment in grading and tunnel bores of about $3.6 billion. Certainly we ought to be permitted to write that off. A write off provision was in the Tax Bill for a while; it was taken out in the early hours of one morning. As for the rolling-stock amortization provision, there's an obvious period during which that will have to be watched to see what effect it has. It has been very helpful indeed in the case of the Union Pacific.

Q. Speaking for the industry as a whole, do you feel that orders for new equipment this year will be up to last year's levels?

A. No. The gross revenue is not there. New equipment orders this year are going to be substantially affected by the wage increases that are coming along in 1970. A lot of people simply aren't going to have the money to buy equipment. They'll be too busy paying it out in payrolls.

Q. You have often expressed confidence about the railroads' long-range prospects. How do you feel about this today?

A. I am no less optimistic about the longer term than I ever was, not one bit. The traffic will be there; we are going to get it. Even today, there are individual instances within the railroad industry where people are preparing for that happy day.

Perhaps what I'm expressing is a little discouragement about the ICC having labored mightily for three and one-half years to come up with an incentive rule which would increase the use of railroad equipment—and having brought forth a rule which would decrease the use of railroad equipment.

Q. The proposal has been advanced that a government capital pool be set up—perhaps as much as $1 billion a year—to help railroads finance fixed-plant improvements Do you find any merit in this?

A. I have never thought so. I suppose that what this proposal contemplates is guaranteed loans. I'm not sure that what you'd have to go through to get it, plus what you'd have to do to maintain it would result in any net improvement. I think we'd rather do it ourselves. ■

As one money-manager sees it

Union Pacific Vice President-Finance W. S. Cook answered these questions put by Railway Age:

Q. What have been the results, insofar as UP financing needs are concerned, of the past several months of high-cost money?

A. New capital programs, as in the past, are carefully evaluated from the point of view of immediate and long-range profits. Such evaluation has to give cognizance to the immediate cost of money and the outlook for such cost. To date, no deserving program has been deferred solely because of high cost of money during the past several months.

Q. Do you now anticipate a further drop in the prime rate and, if so, how will this affect the company's immediate (next 6 months) financial planning?

A. The prime rate recently dropped from 8½% to 8% and we anticipate a further decline in 1970. However, our financing programs will continue to be flexible during the balance of the year, geared more to the action of intermediate and long-term interest rates rather than the action of the prime rate.

Q. To the extent that you have relied on short-term paper "to ride out the storm," do you anticipate converting this into long-term debt if interest rates decline further? At what point would you make this move?

W. S. COOK

A. Since the middle of the fourth quarter of 1969, plans called for the use of bank credit and the commercial paper market for the immediate cash needs of the Railroad. Currently, plans call for the elimination of expensive bank debt prior to the year end, the timing for such action depending on developments within the bond markets. However, commercial paper over an extended period of time should represent reasonably low cost financing, so a considerable amount will be maintained in our capitalization. Accordingly, there are no immediate plans to refund outstanding commercial paper with long-term debt.

Q. Do you as one of the industry and as an observer of conditions generally, feel that railroads have an urgent problem in refinancing long-term debt? If so, how should the industry deal with the problem?

A. The railroad industry is confronted by both pressure on profitability and significant cash requirements. Accordingly, the problem of refinancing existing long-term debt could prove troublesome, particularly in view of the low coupons on such maturing debt. First, the industry should continue to concentrate efforts to (1) improve profits through cost control, (2) establish a dynamic pricing system, and (3) recapture lost markets. Second, innovative thinking with respect to the timing and the type of financing will have to be undertaken. For example, offshore financing under certain conditions could become prevalent.

Q. To what extent does UP make use of its cash position for short-term investments—for overnights, weekends, or other less-than-30-day periods? What risks are involved in such actions? What return, figured annually, have you averaged over the past three years?

A. After determining the level of cash balances required for operating purposes, we have always had an aggressive short-term investment program for funds in excess of such balances. Indeed, overnight purchases are a frequent occurrence. Emphasis is placed on (1) the quality of the security purchased, and (2) the liquidity thereof evaluated against the cash needs of the railroad. The risks connected with such an investment program are, of course, minimal and the returns are attractive. ■

PURCHASING/MATERIALS MANAGEMENT:

Is there a better way? N&W says "Yes"

By **FRANK MALONE**, Washington Editor

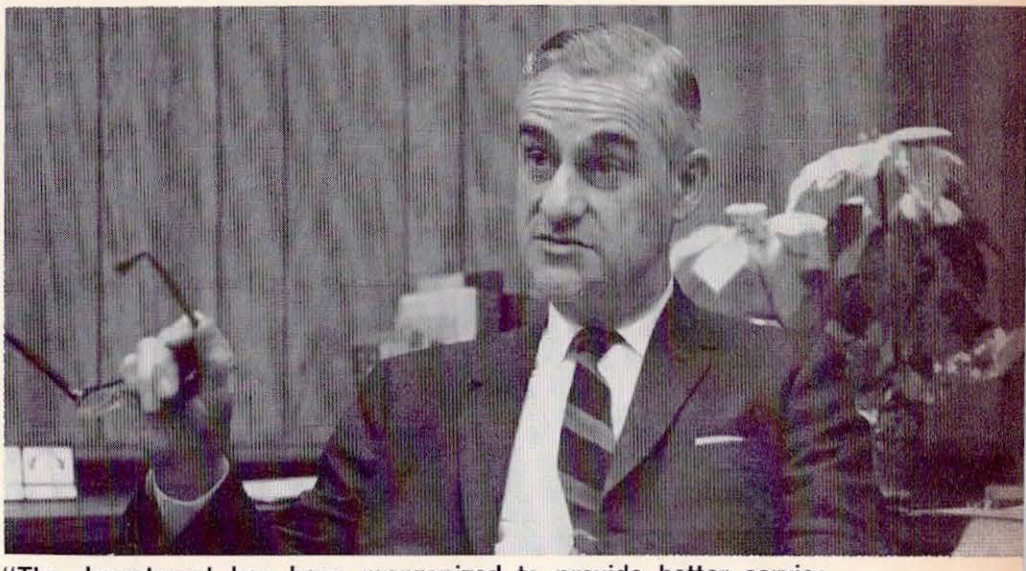
If there's a glamor-side to railroad financial management, it's over on the side where capital programs are planned. The money goes out in large chunks. There's a nice ring to the "millions" and "billions" that such spending involves.

But the capital side is only half of management—and in some years, it's a small half. Year after year after year, railroads spend as much or more just to keep the property operating. It's the job of the purchasing and materials management people to keep plugging away on this glamorless task—trying to keep costs down, making sure the right quantity of the right material is in the right place at the right time, working closely with using departments, working to integrate the buying function with the material-distribution function. Trying, in short, to spend wisely.

Many roads have been taking a whole new look at this operation—upgrading it, making it work better. Case in point: Norfolk & Western, under the leadership of Vice President-Material Management Edward J. Gentsch.

Although their duties covered similar areas of Norfolk & Western operations, R. E. Rice material-control supervisor for cars, and William R. Clark, purchasing agent for cars, used to have a hard time getting together. Their offices were at separate locations in N&W's headquarters at Roanoke. They had to communicate by company mail, by telephone or by pre-arranged get-together. Now, however, Rice and Clark are on the same floor, across the hall from each other, and, as Clark puts it, "We don't have to set up a meeting every time we want to see each other."

The benefits of such proximity are obvious: immediate personal communication, reduced memo-writing and reading, and more efficient use of time —all adding up to faster action. And the benefits are being felt not only by Rice and Clark but by everybody in N&W's new materials management department.



"The department has been reorganized to provide better service . . . to reduce inventory . . . and distribution costs."
Edward J. Gentsch, Vice President, Material Management, N&W

Along with the shuffling of bodies, the railroad's reorganization of its purchasing and stores activities includes new purchase order forms and processing, a new materials catalog, and a many-functioned computer system.

● **Computer system coming.** All the elements except the computer system are in operation now, and the basic data processing system will be completed by June. "Three of our four regions are now in the computer," says the man behind the re-organization, Vice President Gentsch.

"Functions of our department," Gentsch says, "now include the planning, requisitioning, purchasing, expediting, receiving, warehousing and distributing of all railroad material.

"Specifically, the department has been organized to provide better service to the using departments, to consolidate related personnel and service functions, to reduce the time needed for the communications required in procuring material, to increase the availability of stock information, to make existing inventory available at all using points, and to reduce inventory, clerical effort, distribution costs and procurement lead time."

Most of the changes have taken place since Gentsch's arrival from Penn Central in February 1969. Gentsch was a PC purchasing agent. After less than six months on N&W, his title went from vice president-purchases and stores to vice president-material management. The new title covers the new department most appropriately, Gentsch says, adding that the terms purchasing and material management are "redundant."

The total materials management concept, Gentsch says, starts with materials control at the top level; ranges through business forecasting with purchase planning included; is broken down into *what, how many, when* and *where* to schedule, and is completed with actual receipt and distribution. And the single objective of this unified concept, Gentsch adds, is "to make sure the summation of all the elements of cost produces the lowest possible unit costs."

● **Bodies shuffled for efficiency.** That objective is the reason why R. E. Rice and Bill Clark are now located just a hallway apart. The rest of the Department's "car group" is similarly situated, with purchasing people on one side and material people on the other. The same goes for locomotive, maintenance of way-signaling and communications and miscellaneous groups, too.

"We like to gang up on the salesman," Gentsch says jokingly. Actually, the "ganging-up" means time saved for both buyer and seller. As for salesmen, Gentsch says: "I think it behooves us to get them in and out rapidly."

At one end of the corridor occupied by the various groups are the offices of Gentsch, the purchases and materials

The other side of the coin

Purchases of fuel, material and supplies Railroads of Class I—Calendar Years 1969 and 1968

Item	1969	1968
FUEL		
1. Fuel oil—diesel	$ 417,667,000	$ 408,854,000
2. Fuel oil—residual	5,236,000	6,149,000
3. Coal	5,486,000	5,946,000
4. Gasoline	11,404,000	10,244,000
5. All other (including heating oil and propane)	6,647,000	7,342,000
6. Total fuel	446,440,000	438,535,000
FOREST PRODUCTS		
7. Cross ties, wooden	$ 79,104,000	$ 61,319,000
8. Switch ties, wooden	7,265,000	11,421,000
9. Lumber (bridge and building, piling, posts, bridge ties)	16,252,000	14,407,000
10. Lumber, equipment (incl. manufactured articles)	17,098,000	14,102,000
11. All other forest products	3,095,000	3,233,000
12. Total forest products	122,814,000	104,482,000
IRON AND STEEL PRODUCTS		
13. Rail (new and secondhand, except scrap)	$ 83,613,000	$ 77,826,000
14. Axles and wheels for cars and locomotives	50,736,000	44,571,000
15. Track and switch material	84,275,000	82,775,000
16. Steel, fabricated, for bridges	3,438,000	2,906,000
17. Iron and steel (bars, shapes, sheet, tubing, chain and wire rope)	19,615,000	16,921,000
18. Locomotive forgings and castings (malleable or steel, and trucks)	7,365,000	6,071,000
19. Car forgings, castings and specialties	115,072,000	111,474,000
20. Bolts, nuts, washers, rivets, lag screws, pins and studs	6,613,000	6,174,000
21. Springs for cars and locomotives	5,264,000	4,941,000
22. Tools, track and roadway, all kinds, and parts (except automotive equipment, aircraft, and parts)	25,358,000	20,424,000
23. Stationary machinery and parts	18,990,000	21,184,000
24. Pipe, iron and steel, pipe fittings, and plumbing fixtures	6,647,000	5,162,000
25. Hardware, hand and small machine tools	24,851,000	22,773,000
26. Cast iron water pipe and culvert pipe (except building materials)	1,903,000	1,767,000
27. Total iron and steel products	453,740,000	424,969,000
MISCELLANEOUS		
28. Building materials (brick, cement, gravel, lime, sand, stone, roofing, siding, and fencing)	$ 7,589,000	$ 7,602,000
29. Lubricating oil and greases, journal lubricating pads, wiping rags, waste and illuminating oils	51,368,000	45,901,000
30. Non-ferrous metal and products	25,688,000	22,507,000
31. Ballast and riprap	25,410,000	21,500,000
32. Electrical materials (including electrical material for diesel locomotives)	50,174,000	52,904,000
33. Stationery, printing and office supplies	47,020,000	47,452,000
34. Commissary equipment and supplies	8,868,000	9,075,000
35. Rubber and leather goods	6,058,000	5,484,000
36. Chemicals, compounds, drugs, glass, laboratory equipment, lacquers, painters' supplies, paints, varnishes	53,361,000	43,410,000
37. Passenger car trimmings and accessories	8,680,000	8,288,000
38. Locomotive, train and station supplies	32,062,000	29,038,000
39. Communication and signal materials	65,352,000	64,263,000
40. Air brake material	24,284,000	20,699,000
41. Appliances for locomotives	6,783,000	5,455,000
42. Automotive equipment and aircraft, and parts	14,578,000	14,237,000
43. Diesel material not elsewhere classified	129,280,000	101,067,000
44. All other miscellaneous (incl. concrete ties)	74,199,000	67,232,000
45. Total miscellaneous	630,754,000	566,114,000
46. Grand total	$1,653,748,000	$1,534,100,000

Source: Reports of the carriers to the Economics and Finance Department, AAR.

managers, and a single reception room. A salesman starts from one central waiting room, and everybody he wants to see is within a short walking distance.

The corridor with purchasing people on one flank and their materials counterparts on the other occupies one side of an entire floor devoted to the Department's operations. Part of the remaining space is occupied by what amounts to extension of each of the four groups—car, locomotive, M/W-S/C, and miscellaneous. In line after the purchasing staff and the stores staff are the clerical staff for both halves—and the clerical staff, too, is arranged in across-the-hall fashion. In their case, however, there are no walls between them. Thus, the entire operation of one group stretches in a straight line across the Department's floor.

"Now," Gentsch says, "we are moving papers as little as possible. We used to run them back and forth until they were worn out."

The Department used space that once was divided by two walled corridors, "with files all over the place." There were two separate reception areas and two separate sets of clerks. Once the shuffle was set, Gentsch says, "we knocked out every wall we could find," and an extra 1,000 square feet of floor space became available.

● **Order form and process changed.** The group approach is complemented by a radical change in both the form of N&W's purchase orders and the process for placing those orders.

Foremost in the new procedure is the rule that all orders are to be placed by the MM department only. As the Department directory tells salesmen crisply: "The Material Management Department authorizes the issuing of purchase orders. However, inquiries may originate from various other departments."

That note, Gentsch says, "is a tactful way of saying we don't like the back door method."

Consequently, the method of placing an order has undergone a change. Formerly, the man in the using department who thought something was needed would first go to somebody in the Stores department. There, a check would be made to see if the time were available from some other on-line location. If not, the Stores man would then write to the appropriate purchasing agent who would place the order.

Now, however, the man in the field takes his order directly to a new officer, the Materials Management administration manager, who occupies a glass office in the middle of one side of the Department floor.

The administration manager, J. R. Garrison, operates from his see-all post

much like a yard controller works from a tower. Garrison first checks the nearby inquiry apparatus to find out if the needed item can be obtained from a point on the N&W system. If not, he directs the order to the appropriate purchasing man, who is within earshot.

The order itself has undergone changes, too. The order number is broken down into three basic groupings. The first group of numbers is a vendor code showing who makes the item and where it is produced. The second numbers show the origin of the order as well as sequence and will match it with the eventual invoice. The third grouping designates the destination of the item.

● **Data processing system will help.** Supporting the entire materials management effort is a new computerized data processing system designed to produce a perpetual inventory control.

From 550 location points in the N&W system, input on stock will move through machines located at each of N&W's 15 division and terminal points. The updating will take place daily.

"At any time, we will be able to inquire of the machine about the stock at any point," Gentsch says. Or, "we will be able to inquire about the status of any item—how much of it we have and where it's located."

Eventually, Gentsch says, the computer will provide all the information needed for the Department to carry out its functions. One of the big services will be a report on consumption. The computer will tell how much of an item has been used in an indicated time. Or how much for a particular use.

For example, Gentsch says, take the H11c hopper car. Coal is N&W's biggest commodity, and the H11c is its biggest load-carrier. "So we'll have this printout to tell us exactly what was consumed for the H11c cars."

The computer could also be called on to give a report on a supplier. "I like to know what we've placed with EMD and how much business we're giving them," Gentsch says.

Other reports will be available on the total stock status at a particular location, the lead time needed for delivery of an item, the quantity needed, the time for reordering.

That's a lot to expect from the computer. But Gentsch expects that and more. "It's a very short step between that and having the machine actually print out the order," he says.

Already, some results are showing. Formerly, N&W had to find storehousing for 95% of the items it purchased. Now, Gentsch says, the figure is under 25%, the balance is at the point of use. And, he adds, "to the utmost of our ability, we're going to head for the zero inventory level." ■

Watching Washington

FRANK MALONE

REG WHITMAN ONE YEAR LATER

A U.S. flag stands in one corner, a Transportation Department flag in the other. The carpet is red and thick. The window shows assorted Government buildings. A former railroad general manager (40 years on the Great Northern) paces between the window and a tidy desk. He passes pictures of President Nixon and Transportation Secretary Volpe—and the framed commission of the Federal Railroad Administrator.

That commission was accepted one year ago by Reginald N. Whitman, who a few weeks ago moved into a spacious new office in the new Transportation building. That move had a certain symbolic value for Whitman and his staff.

Like everybody else at FRA, Whitman likes to view the new Rail section—a veritable hippodrome compared with the closet FRA previously operated from—as a sign that FRA's role and needs are finally being appreciated.

Whitman claims another gain from the time in the bureaucratic jungle—a broadened outlook. "I find," he says, "that my views and answers are changing as the bigger picture unfolds." Put another way, he "had to learn the art of compromise to a greater extent than in the past."

DELAYED REPORT ON RAIL NEEDS . . .

Although Whitman doesn't say so directly, his attendance at the school of compromise may account for his delay in delivering the report on rail needs due early this year. The report has been "re-structured three or four times," and may not move to Secretary Volpe for two more months.

Whitman intends, he says, "to make that thing a first-class effort." What Whitman wants to produce is a document that promotes railroads *as an industry*. Such promotion within the Government is one side of the FRA role as Whitman sees it.

. . . MUST PROVE FRA LEADERSHIP

The other side of that role is leadership of the industry itself, Whitman adds. Leadership, he says, is "the only pressure we can exert on the railroads. But: "We can't lead if we're not accepted, and we can't be accepted if we don't promote the industry as a whole."

The report, then, is doubly important. It must prove to the railroads that FRA really represents them within the Government, and it must prove to the Government that the railroads really deserve what FRA says they need.

The demands of drafting a "first-class" report help to explain Whitman's reply to the question: Would he like to be back on the railroad, especially the marvelous new Burlington Northern? "I've been so busy here," Whitman says, "that I haven't had time to speculate on what my road might have been if I had not come."

However, after working on BN merger plans for 10 years, Whitman adds, it does seem "a little odd not to be there to see how it works."

BART'S COMPUTER-SUPERVISED control system can handle as many as 450 cars.

BART sets a

A super-sophisticated control system is wowing visitors as it simulates runs through the transit arteries now nearing completion

The heart of BART is pumping.

Although San Francisco's Bay Area Rapid Transit system is still a year away from actual passenger operation, the computer-supervised control system, which will cause transit vehicles to flow smoothly throughout the 75-mile system, is functioning. Located across the Bay, in Oakland's Lake Merritt station, the vast control and communications center for the BART operation is now making runs—albeit, dry ones—in preparation for the opening of a portion of the transit line in 1971.

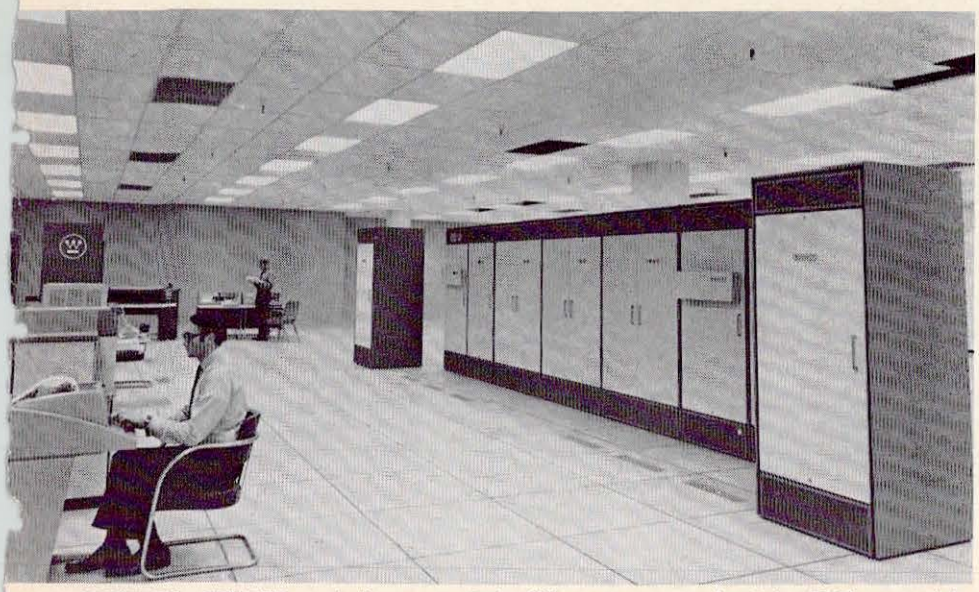
The visitor standing in the back of the spacious subterranean control room at Lake Merritt station, viewing the three control consoles in the center with a giant 88-foot lighted display board beyond, gets the impression that at some point, someone has got to start a count-down. Surely, anything as awesome as this must be part of a space program, and not part of something as simple as an earthbound rail rapid transit system.

● **Superfast control.** BART is, indeed, earthbound. But it isn't simple. And, the train control and communications systems for it, designed and now being installed by Westinghouse Electric under a $26-million prime contract, are anything but simple. With full responsibility for the safe and efficient operation of BART trains at 80-mph top speeds and at 90-second intervals during peak commuting periods, the Westinghouse control system has to think and act superfast.

The "brains" that keep the heart of BART in rhythmic motion are the computers, three of them located in another large room adjacent to the control room. These computers "must make judgments regarding peak-hour train performance every half-second," says J. William Brownson, Westinghouse manager of train control. "That's too swiftly for human response."

Programming for the BART control

$26-million heart in motion



CONTROL CENTER and its support facilities are approximately 80% complete.

system began back in 1967, Brownson adds. Every conceivable incident that could be foreseen has been cranked into the computers for analysis and paper solution prior to the start of any type of physical operations on the lines. Through the magic of simulation, BART and Westinghouse engineers are now able to conduct studies of the control system's operation, even though trackwork and trackside equipment installation are not completed and new transit cars on order are not due to arrive until August.

● **What simulation does.** One of the real advantages of simulation is that all the functions of an operation can be reproduced and the normal time required to perform them can be squeezed to a minimum. That's precisely what Westinghouse engineers did last month when they conducted a dry run in the control center for the benefit of both Bay Area and national news media people. The simulated "trip"—a 20-mile run between BART's Southern Alameda yard near Union City to Oakland's MacArthur station—was made in five minutes, some 22 minutes faster than a normal run will take.

As the phantom train in the simulated exercise pulled away from the yard, lights on the big 88-foot display board in the control center (engineers at the center are already calling it Mission: Control) began blinking. The left one-third of the panel, under the command of the control console on the left, showed green lights indicating that the electrification system, including the third-rail power, was functioning properly. The middle console and its display board were lighted so as to indicate control of all the system support facilities, such as the ventilation fans, fire alarms, sump pumps and emergency telephones.

● **Where the action is.** The right-hand panel and console, however, were the ones where all the action was. Along this panel section, green blocks appeared and disappeared, to be followed by yellow ones which also eventually disappeared, only to be followed by red-lighted blocks. This display section was showing the progress of the train as plotted along the 20-mile stretch by the computers in the adjoining room. If, along this phantom run, any unusual events had occurred, the computers would have snapped into action to make instantaneous decisions on what would have to be done to restore operations to normal.

The BART train control system is said to be the most automated ever. Aside from being able to operate trains at 80-mph peaks with headways of only 90 seconds, this system will be able to run trains at average speeds of 50 mph, including station stops. Here are some of the systemwide supervisory functions which will be performed solely by Mission: Control from the Lake Merritt station:

—Train protection: train separation, overspeed protection, routing control.

—Automatic train operation: train destination, speed regulation, station stopping, door operation.

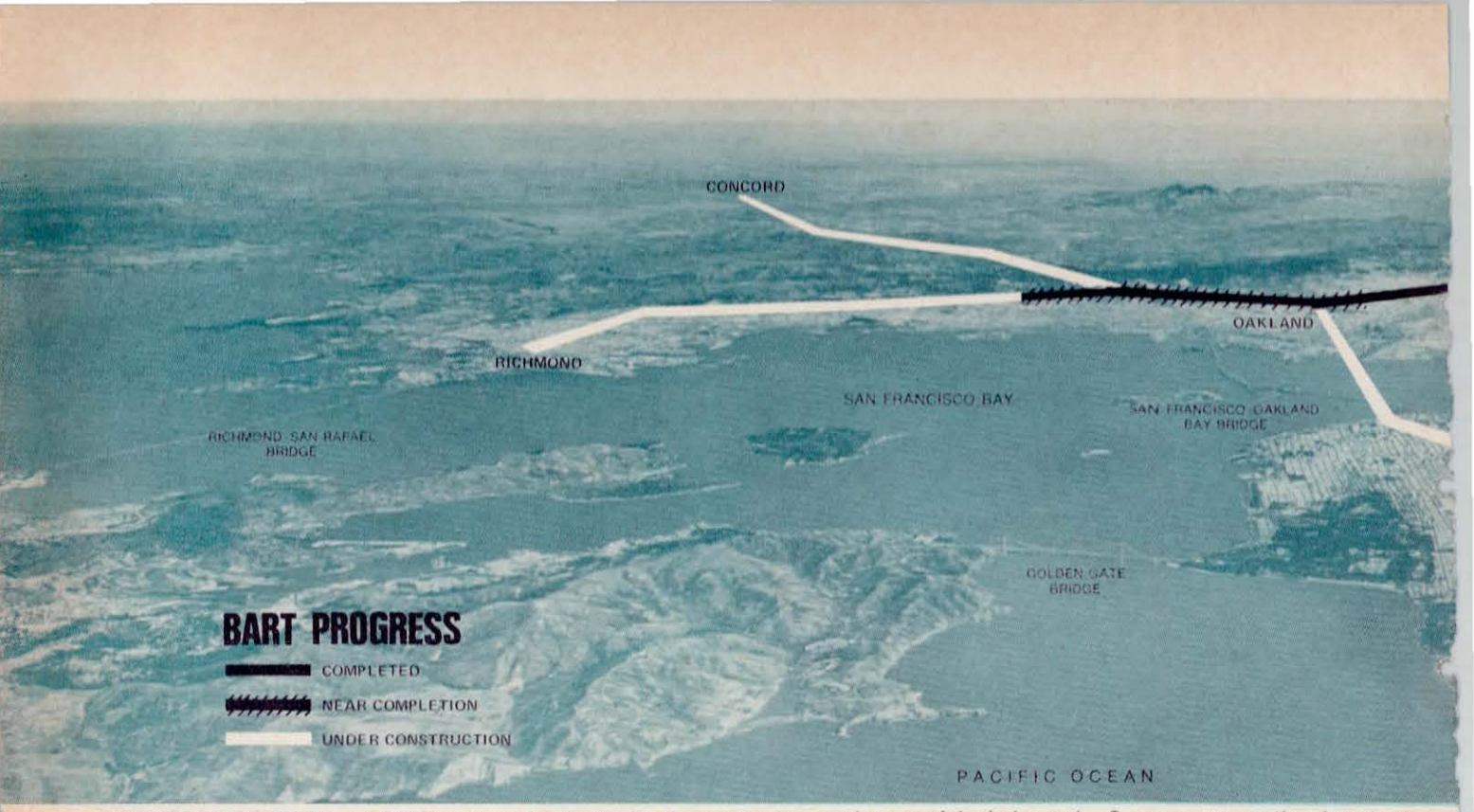
—Systemwide supervision: simulation, station dispatching, yard dispatching, departure testing, train schedule control, car histories, ventilation control, electric power control, fire protection.

● **Nerve center.** Meanwhile, in the area of communications, Mission: Control is the nerve center for such things as data transmission (digital code), and voice transmission, which includes train telephone, maintenance of radio and telephone, and wayside-to-central emergency telephone.

For all intents and purposes, the BART system is designed so that trains can operate without human intervention. Trains, as the simulated run indicated, are started and stopped, their routes are determined, their schedules are set, spacing is determined, acceleration and braking is controlled, precise stopping points at platforms are calculated, and doors are opened and closed—all under the watchful eye of the central control center and its computers. There will be a train attendant on board, of course, but his main functions will be to provide passenger assistance and to operate the train in an emergency.

Altogether, the control center and the support facilities in the Lake Merritt station are about 80% complete. Trackside controls and equipment, meanwhile, are somewhat below that level of completion. But, the center can, of course, handle simulated runs now. Toward the latter part of this year, it will be able to make preliminary tests with prototypes of its cars.

● **No stress on the "heart."** BART will step up operations gradually as more and more of the new cars in the initial 250-car order are delivered. As the new cars appear on-line, the heart of BART, at Lake Merritt station, will have to start beating a little stronger. But, even when all 250 cars are in service, this giant control center won't even begin to show signs of being overworked. Actually, the system was designed to handle as many as 450 cars.



PROGRESS OF WORK on BART system is shown by lines superimposed on aerial photograph. Camera perspective foreshortens

At the two-thirds mark, the pace quickens

BART system is expected to be in full revenue-producing operation in 1972. Stations and platforms are going up all along the system.

There's nothing very rapid about the pace at which a new rapid-transit system can be installed in a metropolitan area. That, at any rate, is what you're likely to learn from many of the 2.9 million San Francisco Bay Area residents who have been waiting, waiting, waiting all these years for their $1.3-billion BART system to be completed.

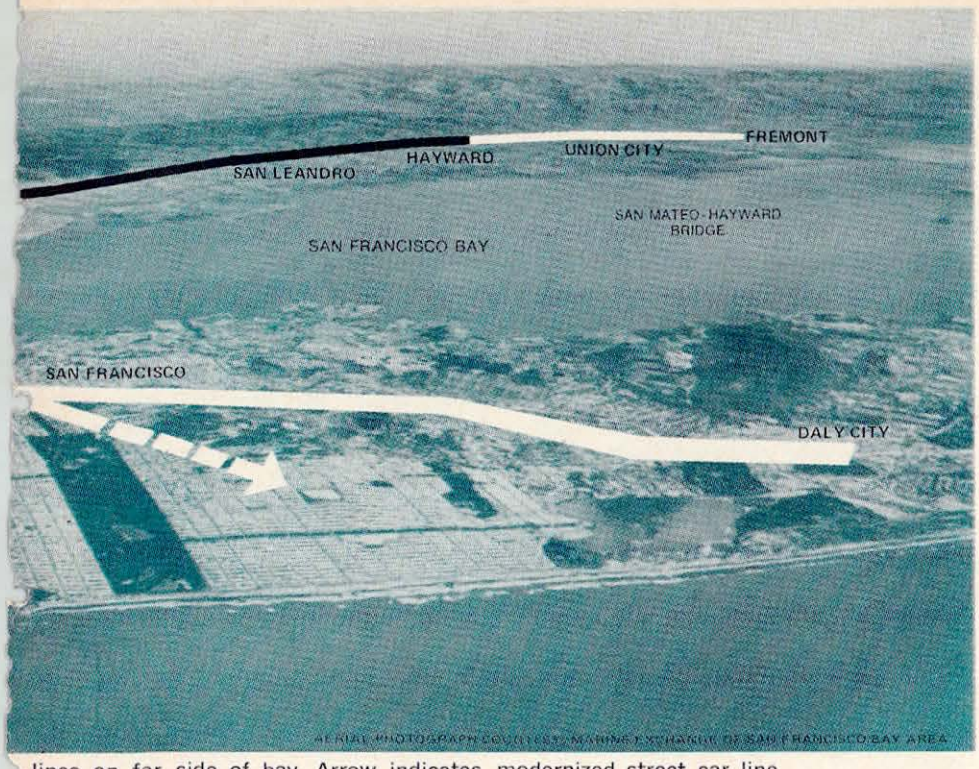
All in all, it's been a long haul for the Bay Area citizens. About 25 years will have passed from the time a trans-bay tube between San Francisco and Oakland—the key to the whole rapid transit idea—was deemed feasible, to that day in 1972 when the entire BART system will be in full revenue-producing operation.

● **An end in sight.** Considering the amount of time that has lapsed between development of the original concept and the expected completion date, you'd have to say the end is now in sight. Over-all, the entire project is about 65% complete, according to BART architects. And the pace seems to be quickening. Perhaps the reason why things seem to be happening faster is that much of the tear-up of property and the razing of buildings along the 75-mile BART route is all in the past. (Merchants and shoppers along San Francisco's famed Market Street might not believe this. A two-tiered subway for both rapid transit and streetcars is still under construction at Market Street and the area is probably in worse shape now than it was following the earthquake of 1906. However, of all the job sites along the route, this one is probably the most active, with contractors working feverishly to get this stretch of subway completed so that the Market Street area can be restored to normal.)

Meanwhile, across the 3.6 miles of bay, in Oakland, the downtown area is returning to normal. Subway sections are completed, streets have been resurfaced, and automobile/pedestrian traffic is falling back into its original pattern. Things are getting back to normal in other East Bay communities, too. Subway, surface and aerial track structures are almost all in place in cities and towns such as Berkeley, Richmond, Hayward, and so on.

● **Change on the Bay.** In some communities, though—especially those with a great amount of aerial track structures—things will never be the way they were before. And, for the most part, residents are delighted that they won't. Aided by Federal grants, these communities have made the rights-of-way in these aerial-structure stretches into attractive parks. In one community, BART officials submitted to pressure from a citizens' group and allowed gardens to be planted in some of the rights-of-way. Thus, it could be that some day BART tomatoes or onions will be winning prizes at the county fair.

Perhaps the most poignant evidence of the end of construction being just around the corner is the sprouting up of stations and platforms all along the five-legged system. Altogether the system will have 38 stations. Each one is being designed and tailored for the



lines on far side of bay. Arrow indicates modernized street car line.

community or downtown area it will serve.

For practical—not diabolical, as some suspect—reasons, a number of stations and several miles of track are beside, and even in between, expressway lanes. One of the main objectives of BART is to lure the motorist-commuters out of their private automobiles and into mass-transportation vehicles. Showing these harried motorists how relaxing rapid-transit commuting can be, especially when they're caught in a giant bumper-to-bumper jam-up, should be quite effective, BART people are hoping.

(As the story goes, when each of the voters in Alameda, Contra Costa and San Francisco counties cast an approving vote, in November 1962, for a $792-million BART bond measure, he felt he was buying a rapid-transit system for his neighbor, not himself. The general thinking was that, by providing his neighbor with a rapid-transit system, this meant there would be one less car on his expressway and therefore he would have an easier time driving his car to and from work. BART officials are confident, however, that the speed and comfort and, of course, safety, of their system will actually transform an habitually motoring public into one that's more mass-transit oriented.)

● **Social factor.** While BART was, in fact, designed and laid out to serve the greatest mass of people in the Bay Area, there was also another key social factor involved in selection of the transit routes. Altogether, the entire Bay Area has 26 communities which are termed low income. It wasn't mere happenstance that the BART system touches each of these communities.

Both government and social agencies are hopeful that BART will provide the necessary low-cost mobility for people in these low-income communities so they can easily reach employment centers. Also, because of the routes chosen for the system, numerous higher-education institutions will be within walking distance of stations. In fact, only about two or three colleges within the three counties paying for BART will be over 20 bus-riding minutes from a station.

Aside from being the first totally new rapid-transit system undertaken in this country in the past 60 years, BART's claim to fame will undoubtedly be its use of automation. Without a doubt, the electrified system will gain worldwide acclaim for its automation. For one thing, fare collection will be advanced to the point where a rider can purchase a ride, or a series of rides, simply by inserting, say, a dollar bill in a vending machine. His cost will be based on the distance he travels. At this time, one-way fares are expected to range from 25 cents to about a dollar.

● **Automatic train operation.** While on trains, riders will be going to their destinations under the control of the worlds' first completely automatic train control system. The nerve center for the system is in Lake Merritt station, Oakland. It features three giant consoles monitoring an 88-foot-long lighted display board of the entire system. The control and communications systems, designed and installed by Westinghouse Electric, have computers serving as the essential brains for the operation. The computers will be called upon to make judgments regarding peak-hour train performance every half-second. This system, which is now putting simulated trains through their paces, is about 80% complete, according to J. William Brownson, Westinghouse's manager of train control.

The 3.6-mile, 57-section, binocular-shaped transbay tube, the longest subaqueous transit tube in the world, had its last section set in place and connected a year ago. Since this portion of the system connecting Oakland and San Francisco will be the last one to go into operation, work in the tube is not as intense as when the sections were being set in place. The $180-million tube is about 96% complete, with track-laying and some electrical and mechanical work yet to be carried out.

Meanwhile, some 500 miles south of the Bay Area, still other vital parts of the BART system—its cars—are on the verge of moving into the initial fabrication stage. In Chula Vista, Calif., headquarters of Rohr Corp., succesful bidder for the $66.7-million contract for the first 250 BART cars, a new 137,000-square-foot building is ready now to handle assembly of the cars. The first prototype is scheduled for delivery in August. Then test runs will be made throughout the remainder of the year on the 23-mile stretch of BART lines between Hayward and downtown Oakland. This also happens to be the first segment of the system scheduled for revenue service in 1972.

● **Only in SF.** With the over-all project now 65% complete, with total construction not much behind that, with lines and stations and right-of-way acquisition close to 100% complete, with many of the 38 stations getting their finishing touches, with the vehicles over 90% complete so far as design is concerned, you can't quite blame Bay Area residents if they start to get a little impatient about putting the system to work. So far as construction is concerned, from here on in there will be a lot more finishes than starts, and the people are mighty happy about that. Once it's all over, though, the citizens will surely say it was well worth the 25 years' wait.

As for San Francisco itself, which has always been a strange study of contrasts, the new BART system will create still another one: Quaint, early-century cable cars will be operating in close proximity to the world's most modern, most automated electrified transit system. It could happen only in San Francisco.

Today's mock-up will be a prototype

Never in its 29-year history has Rohr Corp. failed to deliver an order on time. And, says Keith Tantlinger, vice-president-industrial systems group of the aerospace supplier-turned-transit carbuilder, the Chula Vista, Calif., firm doesn't plan to wreck this record with the $66.7-million BART car order.

In August—August 28, specifically—Rohr plans to deliver the first of 10 prototypes of the BART car to the San Francisco Bay Area for a series of test runs prior to the start of delivery next year of the remaining 240 cars in the order.

From time to time, some of the other builders in the transit car field have experienced some difficulty—either internal, or because of sub-supplier difficulty—in getting cars delivered on time. Rohr people are aware of these difficulties, but they still insist that, so long as California doesn't drop off into the ocean as some clairvoyants have predicted, a giant truck-trailer carrying a completed BART car will be in the Bay Area by late August.

• **Plant is ready.** Rohr is certainly off on the right foot. A new 137,000-square-foot building that will house transit-car erection facilities, plus tracking antenna and boat-building production, was completed in February, a full two weeks ahead of schedule. Engineering and designing for the cars are moving along at a rapid pace. Vehicle design, according to the most recent progress report submitted to BART, is better than 90% complete.

A supplier of components for the aerospace industry for years and years, Rohr has branched off into rather diverse fields in recent years. It builds such things now as patrol boats, giant satellite tracking antennas, a computer-controlled automatic warehousing system called Automove, to name a few. More recently, it acquired an interest in France's Aerotrain, and therefore has plunked itself right into the middle of the exciting air-cushion-vehicle field.

Aerospace, however, is its major field of endeavor. Jet engine pods are big items on the Rohr product list. So are jetliner fuselage sections. And it builds numerous other components for aircraft.

• **First, the model.** Long a stickler for making mock-ups of products before going into actual production, Rohr certainly isn't changing this policy with the BART car order. Joining such things as full-scale, finely detailed models of Boeing 747 jet engines and engine pods and aft sections of the popular 707 jetliners on the floor of the giant Chula Vista plant is a mock-up of a 21-foot section of the ultra-modern BART car design. Also on tap for study by engineers are models of the attendant's cab and the special cantilevered passenger seat selected for the cars. Air conditioning system units and the underfloor arrangement are appearing, too, in model form for testing purposes. Westinghouse, the principal sub-contractor for the cars' under-carriage equipment, has also made some scaled-down models of portions of the running gear. "We're glad we did, too," says W. P. Bollinger, Westinghouse's general manager-transportation division. "After studying our mockup of the car truck, we discovered one of the brake shoes could not be removed and replaced easily. So, we modified the design slightly."

• **New kind of brake.** The braking system for the BART cars is being developed by Hurst/Airheart, of Van Nuys, Calif., under a sub-contract with Westinghouse Electric. This system employs hydraulic-actuated disc brakes, the first in the nation for transit cars, according to William Wheeler, vice president and general manager for H/A. Another advanced feature of the system is the on-board appearance of a small computer which will, among other things, ask a car's propulsion system for immediate dynamic brake application upon command from the over-all system's computer.

Altogether, there are four 23-inch disc brakes in each car's braking system, and its total weight is about half that of any other car system in existence today. H/A is also building in a lot of sophistication in the braking system—like a slip-spin monitor—to aid reliable and safe operations on the BART system.

Currently, a pre-prototype braking system prepared by H/A is under test at Westinghouse Electric before being sent on to Rohr.

Rohr plans to introduce many aerospace manufacturing methods into production of the BART cars. For one thing, the body of the car will be built so that it—and not an underframe—will carry the load. This construction method, called semi-monocoque, will cut down considerably on the weight, making the BART cars the lightest—at 800 pounds per linear foot—of any transit vehicles in the world. Next in line, say Rohr people, are Berlin's, at 850 pounds. By comparison, most transit vehicle in service today, weigh somewhere between 1,000 and 1,300 pounds, Rohr engineers add.

Partial list of BART car suppliers

Aluminum Co. of America	Aluminum extrusions
American Seating Co.	Seats
McGraw-Edison Co.	Batteries
Vapor Corp.	Door operating mechanisms
Westinghouse Air Brake Co.	Couplers; draft gears
Westinghouse Electric Corp.	Propulsion system; brakes; trucks; air conditioning; auxiliary power

Component suppliers selected by Westinghouse Electric Corp.

Hurst/Airheart Products, Inc.	Brakes
Kaiser Aluminum & Chemical Corp.	Wheel centers
LFM-Atchison Div. of Rockwell Mfg. Co.	Trucks
Standard Steel Div. of B-L-H Corp.	Wheels
Safety Electrical Equipment Corp.	Auxiliary electrical equipment
Thermo King Corp.	Air conditioning

by August

• **More weight reduction.** Extruded aluminum sections, some running almost the full length of 75-foot cars, are being made by Alcoa so as to reduce to a minimum the amount of welding and fastening required. Furthermore, stiffeners will be extruded into the long aluminum sections, thus cutting down on the need for fasteners and at the same time reducing the weight.

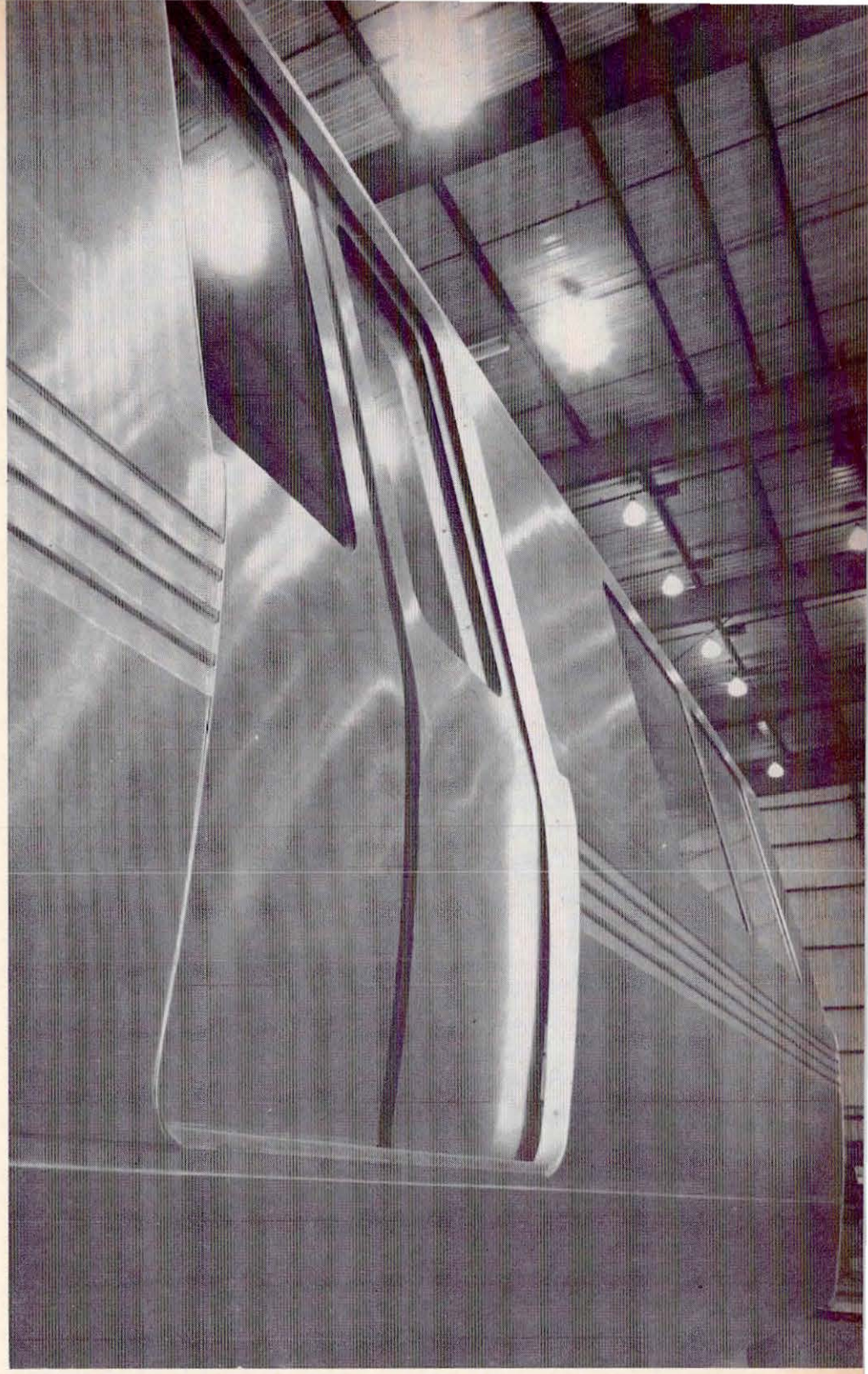
Taking some of the savings generated by using aerospace fabrication methods, Rohr plans to use special "bulletproof" glass in the attendant's cab of each car. This material will be used, not so much for stopping bullets, but more for fending off heavy objects which may be dropped from overhead structures by vandals.

Other features of the BART car will be: (1) fiberglass front ends; (2) combination steel-aluminum wheels; (3) air-spring suspension for each wheel; (4) cantilevered seats, to name a few. Rohr engineers elected to use the cantilever design to cut down on carpet installation costs and to also reduce maintenance costs.

• **Not all new, but . . .** Officials emphasize that some features being built into the BART cars are not totally new and untried. But, points out Tantlinger, some of them are new to the transit-car field.

While the Chula Vista-based carbuilder is wrapped up in transforming its ideas into what will be the world's most sophisticated transit car, it is not suffering at the same time from tunnel vision. There are other metropolitan areas now ready to move out of the thinking and talking stages so far as equipment is concerned. And, Rohr plans to be ready to be an active bidder for these upcoming contracts. Since it's in the over-all rail vehicle business now, Rohr looks upon the $19-million-plus San Francisco streetcar contract, for instance, as one in which it is very much interested.

• **Magic in BART.** But, while Rohr is indeed making long-range plans for future participation in the rail transit business, the magic word at Chula Vista is still BART. This totally new transit system means a lot to Rohr. There's such a thing as an "on-time always" reputation to protect, for one thing. And, Rohr people know full well that never before in the 29-year history of the firm has it placed such a great amount of dependence upon subcontractors to keep the record intact as it has with the BART contract. ■



BART CARS ARE DESIGNED so that the body, not the underframe, will carry the load. Rohr officers say the construction technique will help make the finished cars the lightest per linear foot of any transit vehicles in the world.

A GOVERNOR SPEAKS OUT:

"We need balanced funding for a balanced transportation system"

Gov. Sargent of Massachusetts

Massachusetts Gov. Francis Sargent wants Congress and the Department of Transportation to make highway funds available for other modes of transportation. Sargent, a Republican, is now lining up support for a proposal to permit use of the highway trust fund to pay 90% of the cost of building any kind of transportation facility a state decided it needed. The state would pay the other 10%. Presently 90-10 grants are available for construction of interstate highways only.

"I would like to see a package grant to the states for transportation," Sargent told Railway Age in an interview. "The states would allocate the funds according to their needs."

● **Action has begun.** Sargent began to translate his proposal into action last month when he postponed indefinitely a study of Boston's proposed inner belt, the Southwest Expressway (a section of I-95), and Route 2 (a freeway running diagonally through the northwest quadrant of the metropolitan area).

At the same time, Sargent asked the Department of Transportation to finance a $3.5-million study of alternatives to the proposed highways and submitted to the legislature an amendment to the state constitution which would enable Massachusetts to do on a small scale what Sargent wants the Federal government to do on a grand scale—pour highway funds into a general transportation fund.

"Highways have been sacred," Sargent says, "but more and more people in the Department of Transportation and Congress are thinking about the role that other modes could play in solving the mass transportation problem."

Sargent talking favorably about other modes of transportation is not unlike a member of Alcoholics Anonymous singing the praises of Coca-Cola. Before he was elected governor, Sargent was the commissioner of the Massachusetts Department of Public Works, the state's top highway man.

● **"We were wrong."** "Then, nearly everyone was sure highways were the only answer to transportation problems for years to come," he said when he announced his decision to postpone construction of the freeways. "We were wrong . . . Today, I know as governor of this state, that the errors of the past will cost us dearly if we do not correct them immediately."

Sargent is up for re-election in November, and there are some people in Massachusetts—Democrats, no doubt—who say that his sudden lack of affection for highways stems from the controversy surrounding the proposed freeways. They contend that the freeways will be built ultimately, but work on them will not be renewed until after the election.

Sargent acknowledges the controversy: "It's easy to design and build these highways until they come into heavily settled areas. That's when the arguments start. Governors all across the country who have major cities and interstate highways in their states are faced with the same problem."

One of Sargent's aides insists that the proposed freeways will not be built.

"I would be very surprised," he says, "if the old options were the ones we decided to use. I just don't think that will happen."

● **Based on experience.** Arguing against construction of the Southwest Expressway is the experience of the state with another road, the Southeast Expressway.

"The Southeast Expressway was supposed to solve all our traffic problems," Sargent says. "It was overcrowded the moment it was built."

The Southwest Expressway was proposed as a way to relieve congestion on the older highway. Sargent is not sure it would.

One factor in his decision to put off work on the new road was the traffic forecast. Whether or not the highway could handle the traffic, there was still the problem of handling the automobiles once they arrived in downtown Boston.

"You have to wonder," says Sargent's assistant for urban affairs, Bob Behn, "where you're going to park all those cars. Parking is already a problem in the downtown area."

If postponement of work on the Southwest Expressway and the inner belt turns out to be cancellation, Sargent will be confronted with another problem. I-95 presently stops at the periphery of the Boston metropolitan area. The expressway and the inner belt would carry I-95 through the city.

"If I don't build the inner belt," says Sargent, "what the hell do I do to get the I-95 traffic through the city?"

● **Task force may help.** Sargent hopes that a task force on transportation which he appointed last year will provide the answer. It was the task force which recommended stopping work on the expressways and studying alternatives. Sargent converted the recommendations into a new transportation policy.

"We're looking for a new planning process, one that will be continual," says Behn. "The task force is the first step in the process. We want responsible community involvement in the planning process. We want to develop and

examine and evaluate a number of options."

Sargent describes his new policy as "balanced funding for balanced transportation."

"The governor's position," says Behn, "is that it doesn't make sense to have different sources of funds for different modes."

The specific proposal which has attracted attention is to have the Federal government provide 90-10 grants for mass transit and other modes.

"Highways have been built because the 90-10 money was available for their construction," Sargent says. "No state could afford to turn down that money. But if 90-10 money had been available for other modes, I think we'd have a vastly different transportation system."

● **Encouraging signs.** Sargent and his staff believe they have a chance to muster sufficient support for their proposal. They were encouraged by the reaction of Transportation Secretary John Volpe to the decision to cancel the inner belt. As governor of Massachusetts, Volpe had been a proponent of building the inner belt.

"I expected more of a screech and a holler than I got," Sargent says of his discussion with Volpe. "He's certainly changing his thinking about building highways through cities."

Sargent attended a meeting of the Governors Conference earlier this year to sound out governors on their willingness to support his proposal. He says he was well received.

"Those governors whose states have large city populations are the most concerned, as you would expect them to be," he says, reeling off a list of the governors who gave him encouragement—Rockefeller of New York, Shafer of Pennsylvania, Rhodes of Ohio, Ogilvie of Illinois, and "all of the New England governors."

Washington Gov. Daniel J. Evans, chairman of the Governors Conference on Transportation, Commerce and Technology, has publicly supported Sargent's proposal. One of Sargent's aides says Evans and Sargent have been talking recently.

"We want to find out what Evans will support, just how far he will go," the aide says.

● **Coalition of lobbyists.** By the end of the summer, Sargent hopes to have a coalition of governors and mayors of big cities to lobby for legislation and administrative policies that will give the states flexibility in solving mass transportation problems.

For the present, he is supporting the mass-transit bill now before Congress, with reservations.

"I would like to see a very much expanded bill," he says. "The funds provided in the present bill are not enough. The bill is a turning point, and I support it, but we have got to turn the corner and start spending money for both shorthaul and longhaul rail passenger service."

Does he think Congress will appropriate more money for rail transportation?

"Yes. I think there is a growing public awareness of the need to improve our mass transportation systems, and when the public makes its feelings known, Congress will provide the money."

Hasn't the public given up on rail passenger service?

> "Highways have been sacred but more and more people are thinking about the role other modes could play"

● **"Rail service is better . . ."** "Railroads have gone downhill so badly that people don't think of them in terms of passenger service. But that has to change. Take the problem of transportation between Boston and New York. Rail service is a better solution than air transportation. Anyone who has circled around the airport a few times and then had to cope with the problem of getting into the city would agree with that."

What has to be done to make rail travel competitive?

"We've made significant technological advances in other fields, and we should be able to make them in the railroad industry."

Has he ridden on the experimental TurboTrain?

"Once. We could do much better than that. The problem as I understand it is that it is riding on old track, and the ride is not as slick or as fast as it could be."

● **The subsidy question.** Should government subsidize rail passenger service?

"There's no alternative, as I see it. We've certainly subsidized the auto industry by building highways, and the airlines have been subsidized in one way or another. But the railroad subsidy has been minimal.

"The states have been getting very heavy funding for highways—90-10 or 50-50—and the states have always tried to get as much of the available Federal funds as they could. There simply hasn't been a reasonable amount for other modes."

Some changes could be made in the interstate highway program almost immediately, Sargent feels.

"We're not going to get rid of the interstate highway program this year," says an aide, "but we are going to change it."

Massachusetts may come up with some unusual solutions to its immediate problem. Citing an example of an alternative to the eight traffic lanes and four breakdown lanes which would have been built for the Southwest Expressway, one of Sargent's staff members suggested that four lanes be built and that the expressway be closed to automobiles during rush hours. Buses would run up and down the highway during the peak hours, connecting Boston with a series of park-'n-ride facilities along the route.

Another suggestion was to provide delayed access for automobiles and immediate access for buses during rush hours. When the highway becomes congested, automobiles would be required to wait on the ramp until traffic eases. Buses, meanwhile, would be given a separate, uncontrolled access.

A rail transit line was to have been built on the median strip of the Southwest Expressway.

● **Transit line first.** "The rail line was to have been built after the highway was finished," a staff member says, "but it probably would make more sense to build the transit line first. Get the commuters in the habit of using public transportation, then make the highway alternative available."

Although Sargent was able to persuade Volpe to at least explore the alternatives to superhighways, the governor still has a long road—or track—to travel before he can consider implementing the alternatives.

His proposed amendment must be passed by two consecutive legislatures. Only 25% of the legislators need vote for the amendment to pass it, but Democrats outnumber Republicans in the present legislature by a 3-1 margin. Sargent says the chances for obtaining the 70 required votes are good.

In Washington, Sargent says, "we have begun to develop more support in Congress." He met with the Massachusetts congressional delegation, and he says they support his position. Sen. Kennedy, he says, was enthusiastic.

How long will it take him to effect the changes he seeks? "Some steps could be taken this very year," he says, "but to change the whole system would take several years." ■

Reading takes a new tack in M/W

Two divisions were merged and a Control Center was installed. Efficiency has improved markedly.

Reading has reorganized its maintenance of way department to develop a more effective force arrangement. After five months' experience with it, H. C. Archdeacon, Reading's engineer-maintenance of way, says that, although an unusual amount of snowfall this winter prevented a full assessment of its potential, so far it "looks promising."

In the reorganization, the divisional set-up was abolished and direction of all work was placed on a system level. As an integral phase of the reorganization, a Control Center was established at Philadelphia from which the day-to-day activities of all track-maintenance gangs are directed.

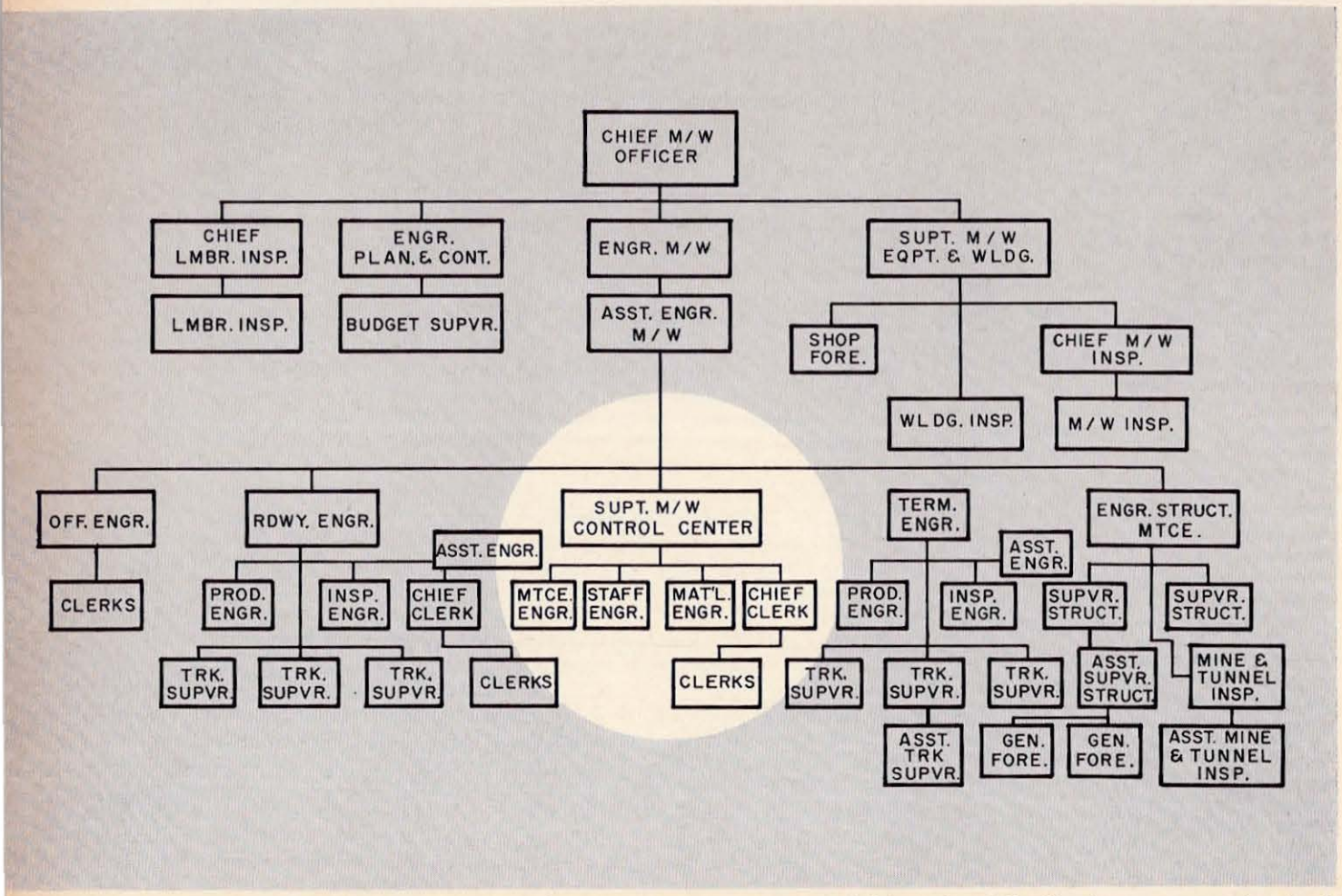
● **How it was.** Prior to reorganization, the field forces of the M/W department were functioning under two division engineers, one at Reading, Pa., and the other at Philadelphia. They in turn reported on maintenance matters to L. D. Freeman, manager-track and structures.

Freeman notes that the road's transportation department had consolidated its forces at Philadelphia and had obtained greater efficiency through an operating control center. He felt that the 1,200-mile railroad was too small for two maintenance divisions, and that a more effective department could be achieved by concentrating authority in one office at Philadelphia. Accordingly, a new maintenance organization was developed. When Freeman was advanced to chief maintenance of way officer, he made the new organization effective Oct. 1, 1969.

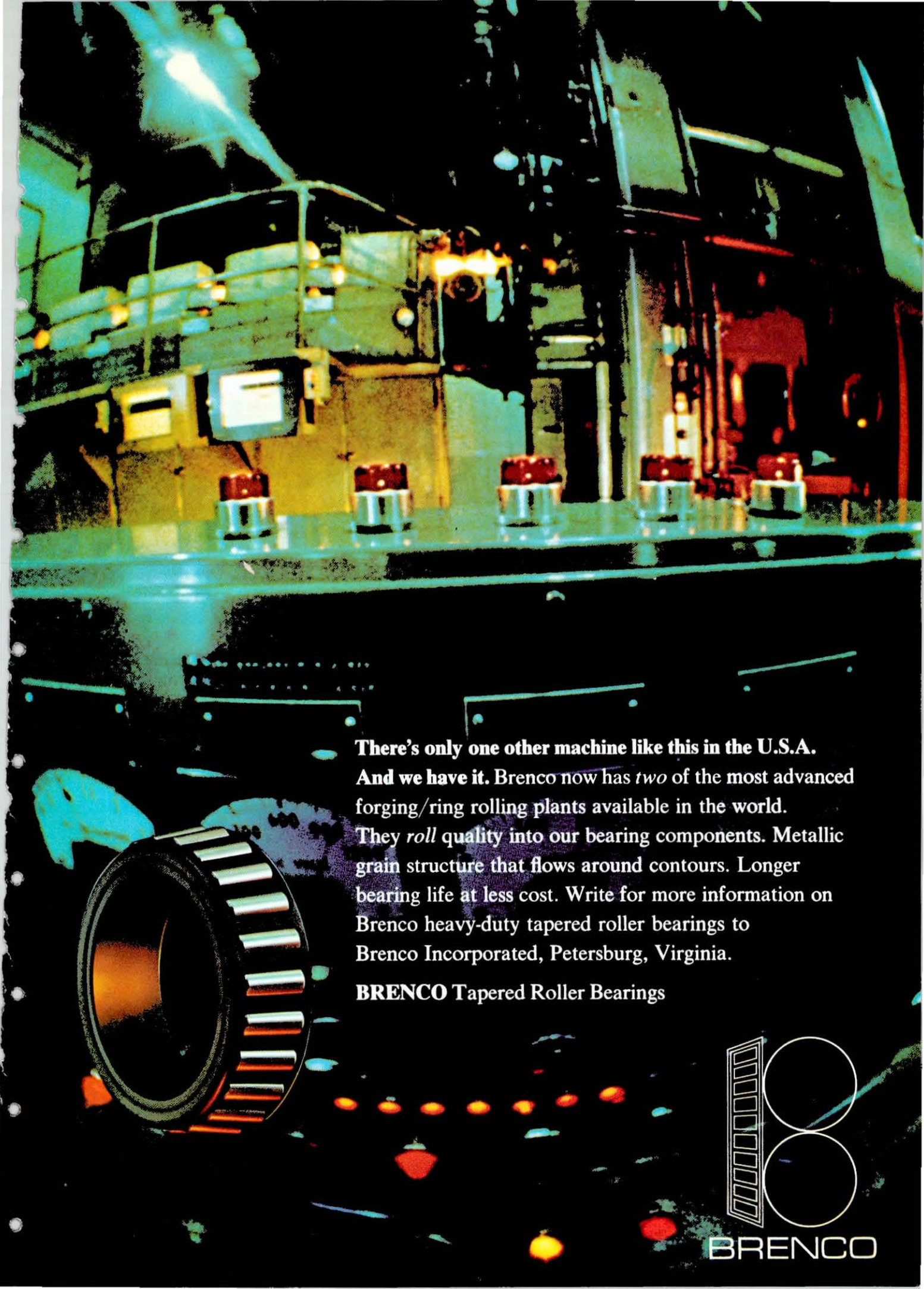
With the former organization, the headquarters staff consisted only of the manager-track and structures, an assistant engineer-M/W track, an assistant engineer, M/W structures and two clerks. They handled the setting up of system programs for rail laying, ballasting, surfacing, tie renewals and bridge-and-building maintenance. All other administrative matters were handled by the division engineers.

In the reorganization it was decided

(Continued on page 53)



REALIGNMENT of Reading's maintenance of way operations eliminated old division set-up. Direction is now on a system level.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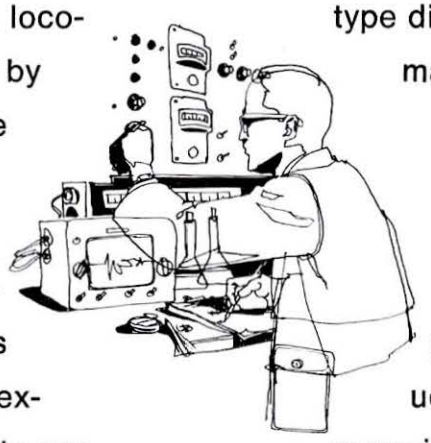

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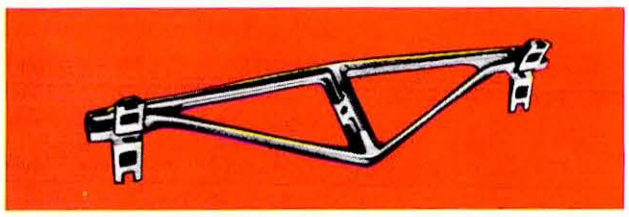

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M/W CONTROL CENTER IS GEARED FOR EMERGENCIES

(Continued from page 44)
to concentrate most of the supervisory work formerly handled on the divisions at the headquarters office. The title of division engineer was abolished. An officer with the title of roadway engineer was assigned to Reading. Another with the title of terminal engineer was assigned to Philadelphia. These men handle only track matters; bridge-and-building matters are assigned to an engineer structures-maintenance at Philadelphia.

Each roadway and the terminal engineer has a production engineer assigned to him with the responsibility for checking performance and quality of work of the mechanized field forces. Each also was assigned an inspection engineer to supervise the work of the inspection foremen, who use Hy-Rail inspection vehicles, and to set up priorities for the work to be done. Clerical work formerly handled by division engineers was transferred to the headquarters office, with the exception of three clerks left at Reading for handling personnel problems and the bulletining of positions on that union seniority district.

An engineer of planning and control was added to the headquarters staff. As the title implies, he plans the work and scheduling of programmed work for current and future years. Also added to the headquarters staff is a chief lumber inspector and an assistant for passing on all ties and forest products required by the maintenance forces.

● **Establishes control center.** Freeman reasoned that, to obtain maximum efficiency from track forces, some means had to be provided for taking immediate authoritative action on day-to-day problems while the action could do some good. For this purpose, he formed a Maintenance Control Center at Philadelphia, manned by a maintenance engineer, a staff engineer, a materials engineer and a clerical force, and headed by a superintendent. Normally, the Control Center is manned from 6:30 a.m. until 6 p.m. In the case of an emergency—a severe snowstorm or a serious derailment—an all-night vigil would be maintained.

The foremen of all track-maintenance gangs—including ditching, brush cutting, highway crossings, bolt-tightening, rail laying, ballasting and tie-renewal gangs—report on their daily work progress over company telephones to the Control Center. Calls usually are made in the middle of the afternoon so that time is available for correcting any deficiency.

Should a foreman report low production because of a machine breakdown, the Control Center gets in immediate touch with the superintendent of M/W equipment to find out if the unit can be repaired in time for the next day's work or if a stand-by machine must be shipped to the job. If a foreman is having difficulty in getting possession of a track from a yardmaster, the M/W Control Center contacts the men staffing the Operating Control Center so this problem can be ironed out quickly.

● **Problems get immediate attention.** Calls from others are also funneled to the M/W Control Center. A trainman may call to report a broken rail, or a yardmaster to report a broken switch. Such reports spark prompt corrective measures. This is in contrast to the delays that often occurred when such calls were made to the division engineers and they were out of their offices.

Materials are kept handy

The Control Center also is responsible for having the necessary material on hand. When required the materials engineer works closely with the purchasing agent and stores department and follows through on movement of material from mill to job site, or from the quarry, in the case of ballast. Ordinarily, the Control Center does not handle bridge-and-building matters but it does do so many times.

The M/W Control Center also works with the Operating Control Center in arranging several days in advance for a general order about trains detouring around track gangs. The two Control Centers also work together on the application of slow orders for the least interruption of service. This is particularly important in the extensive commuter system of the Reading. In some instances, bus service had to be arranged near the end of a single-track commuter line during the off-peak hours that the track crews occupied the track. The staff engineer of the Control Center also is the liaison man for working with the passenger department in getting out notices to commuters for using an opposite station platform.

● **Walls hold other aids.** Aside from the window side, the walls of the Control Center are used to support maps, maintenance charts, a work-force roster by seniority and a message board. These have proved invaluable in times of emergencies, because they provide information on local conditions, machines and work forces available, as well as the foreman's home telephone number.

The maps are metal-backed. Magnetic markers are applied to them for showing the location of such things as programmed mechanized gangs, the various cranes, brushcutters, and bolt-tightening gangs. If a crane and work force are urgently needed at some point, the engineers can refer to the maps and instantly determine the most logical work force and equipment to be moved. The location of all slow orders also is shown by special markers on the maps.

One map, showing the City of Philadelphia and its environs in great detail, is used to pinpoint any particular location.

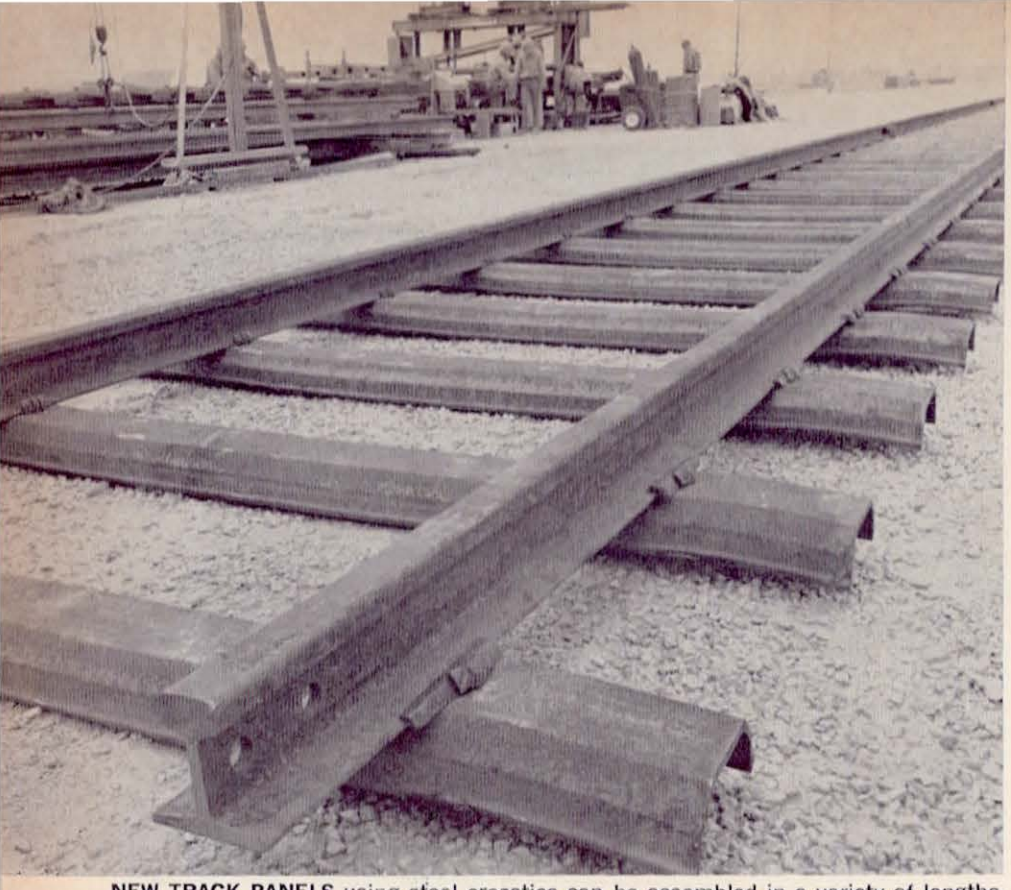
It shows the best route over which to move equipment and men. Complaints from citizens and legal notices from the city also are posted on this map to receive proper attention and payment of fines can be avoided.

● **Message board adds flexibility.** Each of the four engineers in the Control Center has specific assigned duties. They help one another in answering incoming telephone calls if the person called is already speaking on the telephone.

A small message board has been provided; when some matter requires the attention of a gang that cannot be easily reached and its foreman has not yet reported to the Center, the name of the foreman and the problem he is to correct is written on a small piece of paper and attached to the message board by a magnetic holder. When the foreman does call in, the engineer receiving the call glances at the message board and, if there is a message for that foreman, tells him the problem and issues instructions.

Some incoming telephone calls pertain to problems other than track. In one case, an agent called to report the lack of water pressure in the station. In another case, a portion of the intertrack fencing was reported to be loose and waving in the wind. In still another instance, an insulated joint was malfunctioning and was delaying trains. However, in such cases, the engineer receiving the call knows the right person to contact so that prompt corrective measures can be taken.

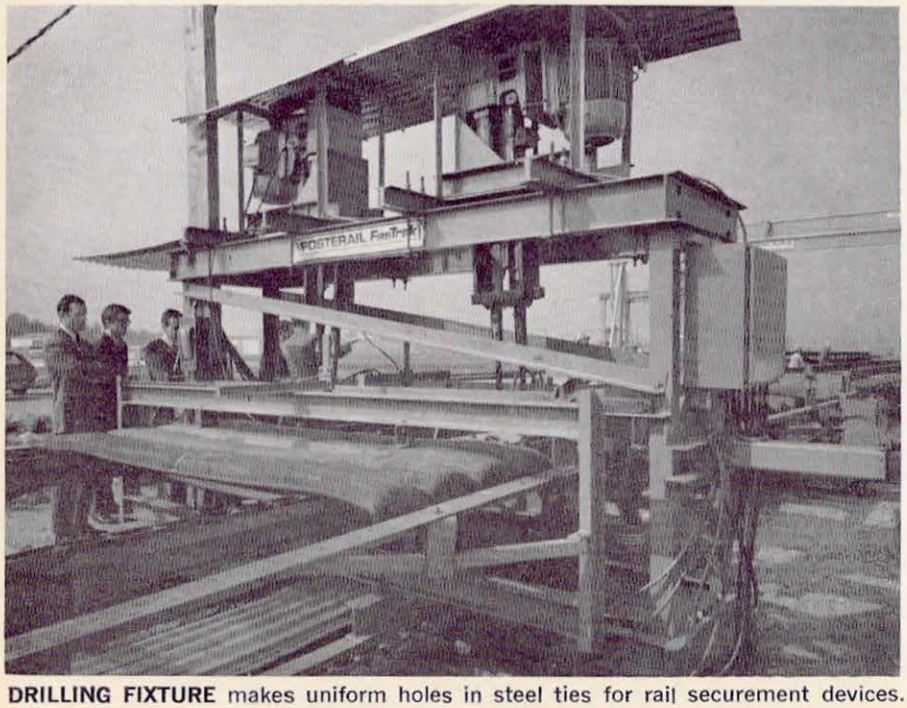
So far, reports Archdeacon, the reorganization has worked satisfactorily and the same number of men in the work force is handling the work more efficiently than before reorganization. The railroad is planning on installing a radio base station within the Control Center, which should further increase its efficiency. ■



NEW TRACK PANELS using steel crossties can be assembled in a variety of lengths.

Is there a place for steel ties in the U.S.?

The L. B. Foster Co. is betting that its all-metal track panel will find a market on industrial and secondary lines.



DRILLING FIXTURE makes uniform holes in steel ties for rail securement devices.

Steel . . . and American railroads. The two seem to go together. But there's one area of railroading where steel has failed to make its mark—track crossties. There, in the area beneath the rails and amidst the ballast, wood has ruled supreme almost from the very beginning of railroads.

Things may be changing, though. There is a place for steel in the crosstie business in the U.S., contends the L. B. Foster Co., and the Pittsburgh-based supplier of pipe, piling and rail is setting out to prove it. Foster has developed an all-metal, machine-assembled track panel which it says can be used effectively in industrial locations and perhaps on secondary rail lines. In introducing the steel-tie panels at its new plant and distribution center in Houston, Foster also unveiled an easily-transportable drilling fixture/assembly jig for assembling track panels on the construction site, if this proves economical.

● **Installation recommendations.** The Foster panel track can be assembled in any practical length, and its strength can be varied simply by changing the weight of the rail and by increasing or decreasing the spacing of the steel crossties. Foster recommends, for instance, that for economical purposes, a lightly traveled section should use 70-pound to 90-pound relay rail with the steel ties on 36-inch centers. Meanwhile, where there's likely to be heavy traffic, 100-pound to 115-pound relay or new rail should be used, with the steel ties on 24-inch or 30-inch centers. Foster claims the steel ties can be spaced farther apart because their bearing surfaces are 10½ inches wide, compared with eight or nine inches for the wood tie.

During last month's demonstration, Foster assembled several panels. Any length rail, either new or relay, can be used in panel production. At present, the steel ties and their fastenings are available only from foreign sources. This is because they are widely used abroad while in the U.S., up to this time, conventional wood ties and spike fasteners have predominated.

● **Domestic interest?** Foster hopes that domestic steelmakers will become interested enough in the steel tie to elect to produce them. At the present time, open channel and crimped end steel ties, both produced overseas only, are being used in the Foster panel. "We're pretty much convinced that the open channel tie will be quite serviceable in almost all types of installation, says H. N. Lucas, manager of Foster's track

department. "We've run numerous tests with both the open and the turned down types, and we like the open one because it's easier to handle and install."

The steel ties used in the Foster panel are about eight feet long, 10 to 11 inches wide, and three-and-one-half inches deep. An eight-foot tie was chosen so that truckloads of completed panels could be shipped over the highways without load restrictions. Normally, wood ties are eight-and-one-half feet long, but both Foster engineers and other testing firms have found that the six inches lopped off the steel ties does not affect track stability.

No spikes, plates or threaded fasteners are needed to secure the rails to the steel ties in the Foster panel. All that's needed at each rail seat are a pair of special steel jaws inserted in the holes drilled in the ties, and a tapered key which is wedged between the base of the rail and, in most cases, the jaw on the outside. Wedges in adjacent rail seats are driven in opposite directions, which provides anchorage against rail movement in either directions. A small section of a panel has been subjected to exhaustive tests to determine the strength of the panel and its fastening devices. Even under one particular two-and-one-half-million-cycle punishment test, the securement devices held fast and showed no signs of either dislodging or weakening.

● **Overseas track studies.** Actually, Foster has more than just its own testing programs to show the reliability of the all-metal track panel. Elsewhere—in Switzerland, Germany, England, Greece and India, for example—the steel crosstie has been used extensively. As a matter of fact, this year is regarded as the centennial year of the steel tie. Broad studies have been made of all-metal track sections in some foreign countries and the results are quite encouraging, Lucas reports. Even in steel mills, where track components are subjected to perhaps the most severe abuse, the steel ties and fasteners were holding up remarkably well, even after 20 years' service. Service life under less severe conditions may go as high as 60 years, Lucas says.

By no stretch of the imagination is Foster regarding the all-metal track panel as a replacement for wood tie panels in all types of rail applications. To be sure, the panel employing the steel tie has definite drawbacks. For one, it can't easily be used in track-circuited areas. Unlike wood, which is an insulator, the steel tie is a conductor and would quickly foul up signals carried by the rails.

Industrial plants, warehouse complexes and mines are the places where Foster sees the panel working best. Secondary rail lines, too, will be suitable spots for the panel. But, for the present anyway, Foster sees industry and those with rail sidings of their own as the principal marketing targets for its new panel.

● **How much market?** By conservative estimates, at least 1,000 miles of track are laid or replaced in non-main-line settings each year. Furthermore, there are miles and miles of railroad-owned secondary lines which need to be renewed or rehabilitated each year, and the chances of these stretches being track-circuited are very remote, say Foster spokesmen. Thus, they visualize a rather broad market for the all-metal track panel to penetrate.

Cost had been a deterrent

In the past, the steel tie panel has never been able to catch on in the U.S. due to its cost. The Bessemer & Lake Erie once had a million steel ties under about 80% of its trackage. This Carnegie tie, an unsymmetrical I beam, cost about twice as much as a wood tie during the years from 1905 to 1919 when B&LE installed them. Improved preservation processes subsequently increased wood tie life until the steel ties became uneconomical and gradually disappeared.

As it happens now, however, some types and styles of Foster panels are, according to Lucas, "well within the ballpark" so far as comparative prices are concerned. The special drilling fixture/assembly jig developed for assembling the Foster panel has a lot to do with favorable cost structure. This special production equipment permits Foster to assemble four standard panels per hour, using a five-man crew (one skilled, four unskilled).

● **Fast installation.** Like any panel track, the Foster panel can be laid at a fairly rapid pace. At Foster's Houston plant, where close to 2,400 feet of panel tracks have been laid already, the rate has been eight panels per hour on tangents, and four an hour on curves. The track-laying crew has consisted of five men, using a truck crane or a forklift and, in some instances, a flatbed trailer which carries panels from the assembly area to the track site.

Foster has designed its production equipment so that it can be transported on one flatbed trailer. This means that everything can be delivered directly to the track site if it is decided beforehand that volume and conditions warrant such a move. Otherwise, the machinery can stay in one spot and completed panels can be delivered to the track site for panelizing via truck or rail, whichever is most economical. Because of design simplicity, the production machinery can be set up and made ready for production in about two days.

Machine-drilling of the ties and machine-assembly of the over-all panel assures uniformity, which expedites the laying of the panels, says Lucas. This uniformity, he adds, also helps when panels are being installed on curves. In these instances, the keys, or wedges, which are inserted in the outside jaw securements at the time of assembly, are removed and the new panel is muscled into place. Once the proper radius is established, the wedges are re-driven, and the ballast is added.

● **Aid to stability.** Because of the steel tie's channel-shape, tamped ballast is effectively retained, thus increasing the track's stability, Lucas claims. In effect, he says, the ballast tends to become part of the tie, a factor which contributes to the panel track's stability. Tamping can be done by any mechanical tamper or by hand tools.

So far as weight is concerned, the all-metal track panel is much lighter than the wood tie panel. One of Foster's standard 39-foot panels using the open-end steel tie will weigh approximately 4,400 pounds (using 90-pound rail with ties spaced 30 inches apart). The turned-down tie, meanwhile, being somewhat heavier, will add about 300 pounds to the panel's weight. A wood-tie panel of the same size, on the other hand, will weigh close to 7,400 pounds, according to Lucas.

Another thing about the metal track panel that can't be overlooked, Lucas stresses, is its value when it must be scrapped. The metal is almost certain to have some value at trade-in time. The wood tie, on the other hand, may have just a nuisance value.

Foster, of course, isn't selling the wood tie short. It, or one of concrete or of plastic, or a plastic-coated wood tie, can do some things that the steel tie can't, Lucas says. As a matter of fact, Foster engineers designed versatility into their drilling fixture/assembly jig so that track panels with wood ties could be made, too. But, it's still the potential of the steel tie here in America that has the Foster people excited. ■

'How I'd run

The maintenance man

First of all, I'd get out of my office and shake the hands of a few maintenance men. I'd tell them how much I appreciated their work and how important they are to the success of the line.

Then I'd give them cars that are easy to maintain. Like the new stainless steel passenger jobs that Cleveland runs out to the airport.

They weigh a lot less per foot of car length, which means less wear and tear on the bearings, brakes and propulsion equipment. You don't have to paint them, because stainless steel resists corrosion without paint.

And even though stainless cars get dirty just as fast as the old-style painted cars, they don't show it as soon. Now, I'm not in favor of dirty cars, but giving an 85-foot car a bath takes time and money and effort. So if I had to stretch out the time between washings, I'd get stainless cars because they look better longer.

If I were running this railroad, I'd make it a stainless steel line.

this railroad'

The weekly passenger

Well, I'm glad you asked me. I take the train in to go shopping or to meet Harry and I used to think all trains were like the ones on our suburban line.

Then Mother came up to see us from Philadelphia and she was just raving about the new stainless steel Metroliner. So I went back with her for a few days and the trip was really a lovely experience. The seats were so comfortable, and the trip was so fast. Somehow the train seemed so much cleaner. It really spoiled me for our local railroad.

What Mother likes is how the high-speed trains make it easier to visit us. Harry likes the way they get her back to Philadelphia faster. The Metroliner is about the only thing she and Harry have ever agreed on.

If I were running the railroad, I'd try to make every train as good as a Metroliner.

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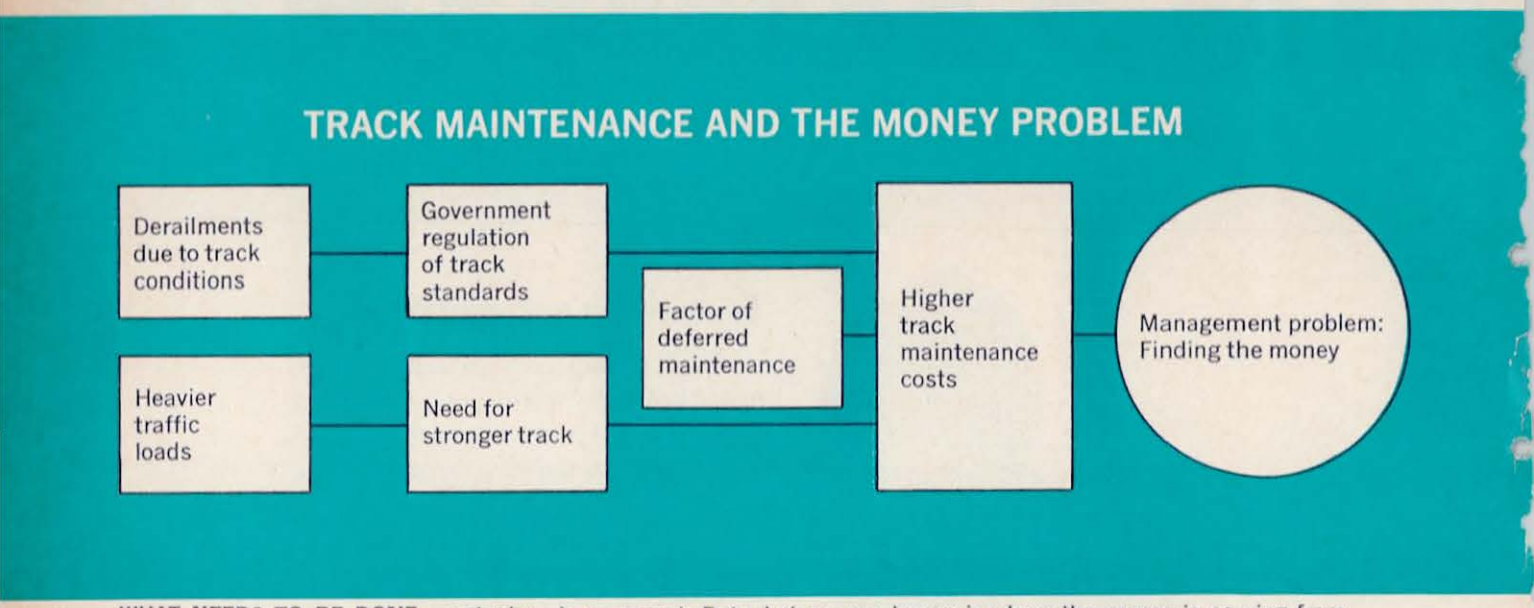

TRACK MAINTENANCE AND THE MONEY PROBLEM
Derailments due to track conditions
Heavier traffic loads
Government regulation of track standards
Need for stronger track
Factor of deferred maintenance
Higher track maintenance costs
Management problem: Finding the money

WHAT NEEDS TO BE DONE—and why—is no secret. But what no one knows is where the money is coming from.

Pressures intensify for higher track

A rising public clamor over derailments has added a worrisome new dimension to a problem that was already big enough.

By **MERWIN H. DICK,** Engineering Editor

Railroad managements are running into a situation with respect to track structures that they have never before encountered. For upwards of a hundred years, the men who ran the railroads were the sole authority over track-maintenance expenditures. They could do with their tracks whatever they felt was dictated by circumstances, including the availability of money.

But now there has been a dramatic change. These same men find that the initiative appears to be slipping from their grasp.

Behind this change is the increase in train derailments in recent years; this, and an apparent increase in movement by the railroads of hazardous commodities. A train derailment that might have been relatively innocuous in past years, involving only railroad property, can now result in evacuation of entire communities as a safety measure. Thus has the subject of train derailments been escalated from a matter of primary concern only to the railroads to one involving the public safety. And when the matter of public safety enters the picture, the lawmakers and regulators can't be far behind.

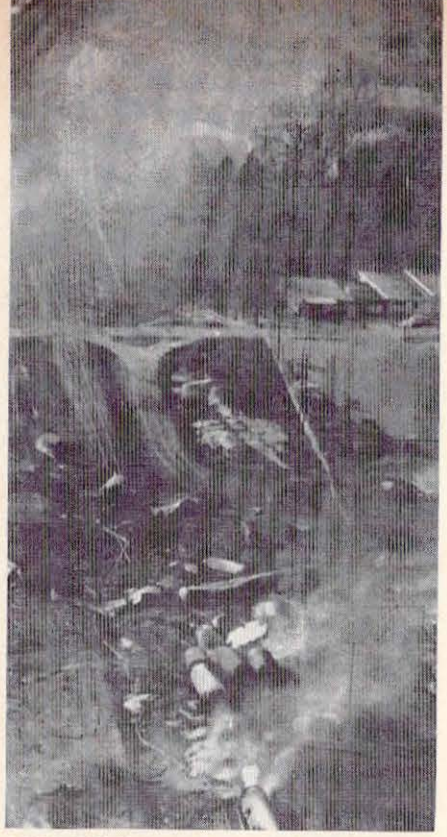
● **Now—a dual responsibility.** The result is that railroad managers, in matters of track maintenance, now find that they have a dual responsibility. As before, they have to answer to boards of directors and stockholders. But in addition and much more so than ever before, they have to answer to public opinion which is making itself felt through local and state agencies and the Federal government.

The railroads do not, of course, have to be told by anyone that they have a problem. They do not have to be told that large mileages of lines have been undermaintained for years. Neither do they have to be told that the problem is being compounded by introduction of cars and locomotives that impose heavier loads on tracks than it has ever had to carry before.

Simply in the interest of sound and economical management a growing number of railroad officers are convinced that track standards need to be raised over large mileages of line. "All properties must continually upgrade and improve their standards to meet the heavier demands of the future," says the chief engineer of a large road.

The derailment problem is simply having the effect of adding a high degree of urgency to this need for upgrading track standards. If it were not for the pressure the railroads are facing to "do something" about their track, it's likely they would be giving themselves more time to put corrective measures into effect.

● **Staggering challenge.** The chal-



ACCIDENTS have aroused the public.

standards

lenge that faces the railroads is staggering in its complexity and magnitude. What we are talking about is a problem that involves perhaps 100,000 miles of mainline tracks carrying an amount of traffic that ranges from medium to heavy. Added to this is an equal mileage of running tracks that carries lesser amounts of traffic, ranging down to the branch lines over which movements take place no more than one, two or three times a week. Beyond this are the thousand of miles of tracks in yards and sidings.

Derailments can, and do, take place anywhere on this vast mileage. The majority of them are not caused by defective track conditions, but are being brought about by such causes as mechanical defects or manpower failures. About one-third of the derailments are traced to track conditions. But it seems that this one-third is causing 90% of the furor over train derailments. Getting the importance of track conditions as a causative factor into the correct perspective in the derailment picture is a prerequisite to a rational approach to the subject.

● **The rocking cars.** The importance of rationality is underscored by some of the derailments that involve high-center-of-gravity, high-cube cars. When a derailment of such equipment occurs that comes about as a result of harmonic rocking action started by operation at the critical speed over track with low joints, can it be said that the track alone is at fault? Can the track be said to be at fault even though conventional equipment may be operated over the same track at the same speed with safety?

Regardless of what answer is given to these questions, there is evidence to justify the position that track parameters and equipment characteristics both play a part in the drama. Carl A. Love, chief mechanical officer of Louisville & Nashville, had something to say about this aspect of the problem in a talk before the recent convention of the American Railway Engineering Association.

He described a series of tests on L&N involving the operation of coal cars over a track which, among other induced characteristics, had 20 consecutive alternate low joints. Love noted that the test work had resulted "in the creation of a specification covering devices, to be applied to heavy, high-center-of-gravity cars for controlling harmonic roll action." This specification, he added, was eventually adopted as an industry standard.

● **Controlling roll action.** More recent work, said Love, "has been directed towards evaluating various commercial devices and configurations for arresting and controlling harmonic roll action. The Car Construction Committee of the AAR Mechanical Division now has a number of reports on these commercial devices that they are evaluating for possible approval for use on interchange cars." Love concluded this part of his discussion by saying that "it now becomes incumbent for mechanical and engineering officers to cooperate in establishing track parameters so that additional maintenance and economic burdens relating to both track and equipment will not be created."

Love also discussed other areas where track and equipment play a joint role in the area of train safety. Dynamic braking is one. ("It is obvious that the use of dynamic brakes has a relationship with the track over which the train is operating.") The shifting aspects of track under load is another. ("It is well known that some loads on tightly laid track create compressive forces in the rail that, under extreme conditions, may result in buckling of the track.") The proper amount of tangent to be applied in a reverse curve to permit long cars coupled together to successfully negotiate such curves is still another aspect of the problem that is currently under study, according to Love.

● **The big question.** There are, of course, many derailments in which the track is unquestionably the sole culprit. Track men are quick to admit this. But here again, pains must be taken to maintain the discussion on a rational level. This requires arriving at carefully considered answers to the question: How best can derailments due to track conditions be minimized?

An immediate stumbling block in considering this question is that logically it cannot be treated as an isolated question, especially from the railroad point of view. Economics must be a major consideration. If safety were the sole objective involved, the answer would be relatively simple: Merely set standards of track construction and maintenance and adhere to them. Safety *is* the sole objective of the railroad safety bill now on its way through Congress. The bill has been passed by the Senate and, at this point, is in the House of Representatives.

The original bill was submitted by the Secretary of Transportation and was one based on consultation among the parties involved, including railroads. But by the time the bill had received Senate approval, it had undergone material changes. It is understood that, as modified, the bill would accord to the various states the right to set standards of their own. Presumably, these would include standards of track construction and maintenance, thus creating a situation that would be extremely burdensome to railroads.

● **AAR minimum standards.** It is no coincidence that the railroads have undertaken a project of their own in the same area. The Engineering Division of the AAR created a committee to develop a set of minimum recommended standards for track maintenance. These will eventually be put to a letter ballot among the AAR's member roads. Such activity is not entirely new to the AAR, for it had earlier adopted a set of recommended minimum standards of track inspection (RA, Nov. 17, 1969, p. 7).

Perhaps one purpose of the AAR's action in developing recommended minimum track maintenance standards is to demonstrate that railroads are capable of taking the initiative in this area. But it is not likely that such action will have any affect on the bill now being considered in the Congress. On that subject here's what John A.

FRA-RAILROAD COOPERATION WILL BE ESSENTIAL

Risendal, the AAR's director of safety, had to say in an address before the AREA meeting: ". . . It appears likely that before the end of the year we will find the Secretary of Transportation vested with authority to establish rules, regulations and standards over many facets of railroad operations which are not presently under his jurisdiction." These inevitably will include some kind of track standards.

Basically, such standards would be politically motivated. Perhaps, as so often happens when political considerations enter the picture, there is some hysteria involved. Certainly, in their consideration of the track safety problem, railroads will not permit hysteria to influence their attitude. They must "keep their cool" in a situation where such control may be extremely difficult.

● **Helping hand needed.** One way in which railroads can manifest a degree of control is to offer a helping hand in the development of track standards by those within the Federal Railroad Administration who are charged with that responsibility. Public statements by FRA officials have indicated that they will not only welcome help from the railroads but actually will find it indispensable.

Risendal also discussed this aspect of the subject. "In developing appropriate rules," he said, "the parties charged with the responsibility will need a great deal of guidance. It is here that the expertise available within the industry must be utilized. Members of the group here assembled [AREA members], representing, I assume, a number of engineering disciplines, must be called upon for assistance in developing reasonable, practicable, and workable rules and standards. I am sure that this opportunity will not be overlooked."

● **Three options.** While cooperating in the development of track standards, railroads will find it behooves them not to overlook the need for achieving any set standards with the greatest possible degree of economy. As they consider the possibilities, they will find there are several options open to them:

—Seeking to maintain track as presently constituted to the required standards by surfacing and lining track as frequently as may be required, and by making such tie and rail renewals as are necessary to maintain the set standards.

—Building more strength and durability into track by increasing the use of welded rail, building up the ballast section, especially in the shoulders, and enhancing the stability of the roadbed by various means including subgrade drainage and grouting projects.

—Endeavoring to develop through research more permanent forms of track construction. The most popular current candidate is a type of construction that uses present rails but does away with tie-and-ballast construction in favor of concrete slabs or beams.

Doubtless, most railroads, in their search for maximum economy in meeting required track standards, will lean in the direction of a combination of the first two options. In doing so they will be regarding the third option as more of a long-range—and perhaps far-out—possibility.

● **A long-range task.** The view that development of a more permanent form of track support is a long-range matter is underscored by experience with plans for a test track to be installed through joint efforts of Santa Fe and FRA's Office of High Speed Ground Transportation. Negotiations for installation of this test were initiated more than two years ago.

Tests will be in Kansas

Types of construction to be tested—including precast and cast-in-place twin concrete beams and precast and cast-in-place concrete slabs—were pretty well set at that time, and a location in Kansas was tentatively agreed upon. But questions were raised regarding the suitability of the site, thereby setting off an extended—time-consuming—search for a better one. Now the site has been established—in Kansas—and indications are that construction will get under way this summer. Perhaps such delays should be considered inevitable in situations where governmental red tape is involved.

But construction of the test track is only the beginning. After construction comes an extended period of testing, and perhaps after that there will be further tests of modified forms of construction.

Then, suppose the project results in development of a type of support rated by the researchers as one that will be capable of carrying heavy traffic safely at high speeds while producing worthwhile savings in maintenance costs. Almost inevitably, the cost of construction will be substantially greater than the present form of construction. Then the issue of a trade-off between the cost of construction and the savings enters the picture.

If we assume that this trade-off is found to be favorable to the new form of construction, and assuming further that railroads will have access to the needed capital, the matter of how long it will be before a significant amount of the new construction is placed in service can be left to the imagination. Surely it will not be within the foreseeable future.

● **Place of the concrete tie.** So, in dealing with the dilemma involving safety and economy now facing them, the railroads must rely for an indefinite period on the present rail-tie-and-ballast construction, with such strengthening of the individual components as may be found desirable. In this effort more extended use of the concrete tie cannot be ruled out. After some disappointing experiences with the prestressed concrete tie in its earlier years, railroads now find that improved types are available. More stringent specifications are being developed by a special committee of the AREA, and a higher degree of interest is being shown in the concrete tie by the railroads here and there.

One chief engineer, following a trip to inspect concrete-tie installations in Mexico, expressed the opinion that track laid with wood ties, and with the rails fastened with cut spikes, is not adequate for present-day traffic. His opinion is that rail-tie-ballast track can be made adequate for such traffic only by using concrete ties, largely for the increased stability they provide. In a recent interview (RA, Feb. 23, p. 65) W. H. Moore, operating vice president of the Southern, said "we cannot continue to depend on a piece of wood to carry a 425,000-pound locomotive."

● **Interspersing concrete ties.** Many railroad engineers are reluctant to consider the possibility of interspersing concrete ties with wood ties, presumably because of the disparate spacing. To get experience in this area, Seaboard Air Line (now part of Seaboard Coast Line) installed a two-mile test section several years ago of concrete ties interspersed with wood ties, reportedly with satisfactory results so far.

For several years, Kansas City Southern has been interspersing concrete ties with wood ties on a regular basis. It is understood that the aim is to produce track with all concrete ties after the second time around. Recently the AREA Special Committee on Concrete Ties inspected an installation of concrete ties on KCS. Several members of the committee have since expressed themselves as being impressed with what they saw. They were particularly impressed by the fact that the newly installed concrete ties appeared to be failure-free, even though the track had not been surfaced in the several weeks that had passed since the installation.

Railroads are thus moving in the direction of strengthening their track structure. The term "strengthening" as

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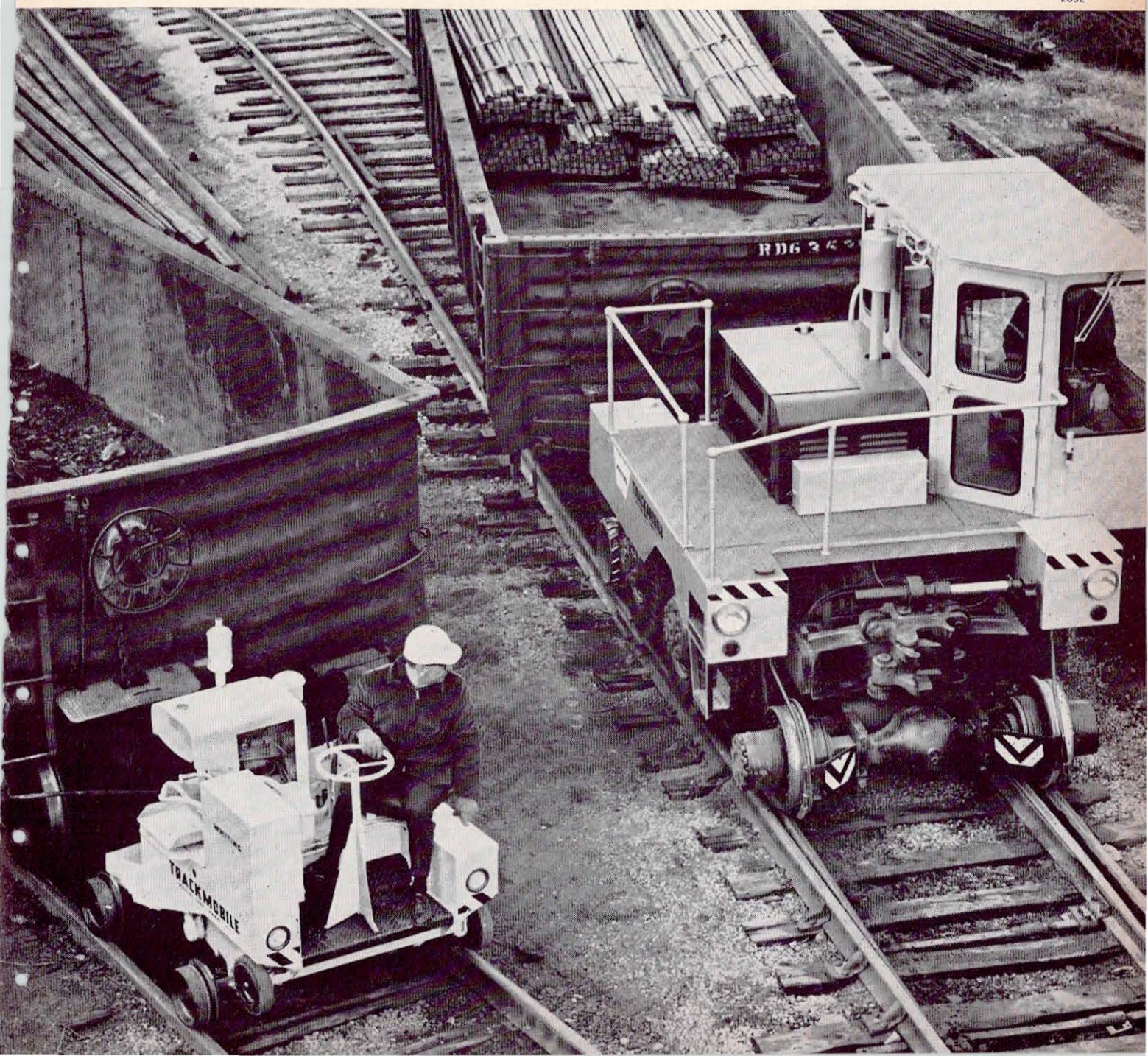


PEAK-AND-VALLEY MAINTENANCE MAY HAVE TO GO

used here implies not only the building of strength back into the properties that have been weakened by years of undermaintenance. It also refers to the process of strengthening individual components of track that is already well-maintained. Many engineers are convinced that this process of strengthening is necessary not only in the interest of safety but also because of the need to place the track in condition to carry heavier traffic at higher speeds.

Top engineers of American railroads are only too well aware of what they are up against. In a recent Railway Age canvass of 25 of these men, 92% expressed the opinion that government regulation of track standards is on the way, 86% are convinced that track-maintenance standards must be upgraded, and the great majority expect that there will be a trend toward larger track-maintenance allotments in coming years, although only a few expect a large absolute increase.

● **Money is crucial.** The matter of money is, of course, the crucial question. Top engineers are reluctant to attach a price tag to the work of upgrading track. This is understandable because of the uncertainties at this time regarding what will be required in the way of track standards.

Another consideration is the variation in the present track condition between railroads. On some railroads, where the track is relatively well maintained, it is conceivable that increases in expenditures will not be found necessary. On others, however, where undermaintenance has been the rule for years, sharp increases in rail and tie renewals and surfacing may be necessary for periods of several years to bring track up to acceptable standards. These increases may even range up to 50% or more, compared with recent years. For the industry as a whole, it seems conservative to predict that the amount of work done on track will have to be elevated to a level 15% to 20% above that now prevailing.

"You've really got to consider that there are two chunks to the problem," said a chief engineer. What he meant was that first there will be the work involved in bringing the tracks up to some required standard, and then there will be the work required to keep them there.

● **Management gets the bill.** The bill for the cost, whatever it turns out to be, is one that will land on the desks of management. It is there that the decisions will have to be made regarding how the problem is to be handled. It may turn out to be the toughest problem ever faced by the people who run the railroads. Whatever the cost, it will have to be paid *by* the railroad, rich or poor. And if work is scheduled that is required to bring the tracks up to government-imposed standards, will management still feel free, as it has in the past, to dictate cutbacks if reductions in expenses appear necessary? There would appear to be risks involved in doing so.

As managers ponder the track problem, there will be several points for them to keep in mind. One is the possibility that bringing tracks up to a prescribed standard and keeping them there in good times and bad may actually prove to be the more economical alternative in the long run to the time-honored practice of alternating between deferred and accelerated maintenance depending on business conditions.

New accounting plan ahead?

Another point for managers to consider is this: There is a cost of being safe, but also a cost of being unsafe. And this latter cost has been increasing, as pointed out by the Southern's W. H. Moore. "Once you thought of a serious derailment costing $50,000," he said. "Today it is easy to get $250,000 to $500,000 just in equipment and lading damage." Indirect costs could bring the total cost much higher, he indicated. Can it be that a trade-off point has been reached where the increased cost of upgrading track can be justified by the savings produced in the form of reduced derailments?

As means are explored for helping to ease the financial burden, depreciation accounting for the roadbed is bound to be considered. It's already being mulled by some top engineers as well as accounting officers. The reasoning is that the tax savings resulting from the depreciation charges would generate additional cash flow—cash that would help defray the rising cost of track maintenance. Such relief, assuming the Internal Revenue Service could be persuaded to allow it for railroads, would, of course, be meaningless to companies operating in the red and they are the ones that would need it most.

● **Will government help?** Can any financial help be expected from the Federal government? Most chief engineers don't think so, except where passenger or commuter operations are involved. However, B. G. Anderson, chief engineer-system of Burlington Northern, believes the railroads have a right to expect indirect help from government. "As the government assumes a role in establishing track-maintenance standards," he said, "I feel they will also have to act responsibly and give consideration to the abandonment of unprofitable branch lines."

E. Q. Johnson, Norfolk & Western's chief engineer, agrees but goes a step further. "If government standards for track maintenance are established," he said, "and require the expenditure of funds not available to the railroads, a national transportation policy will have to be established which will either permit ready abandonment of properties for which adequate maintenance funds are not available or establish a means of providing government subsidies for required track maintenance. Possibly a tax-relief scheme could be worked out with such relief funds earmarked for track-maintenance work."

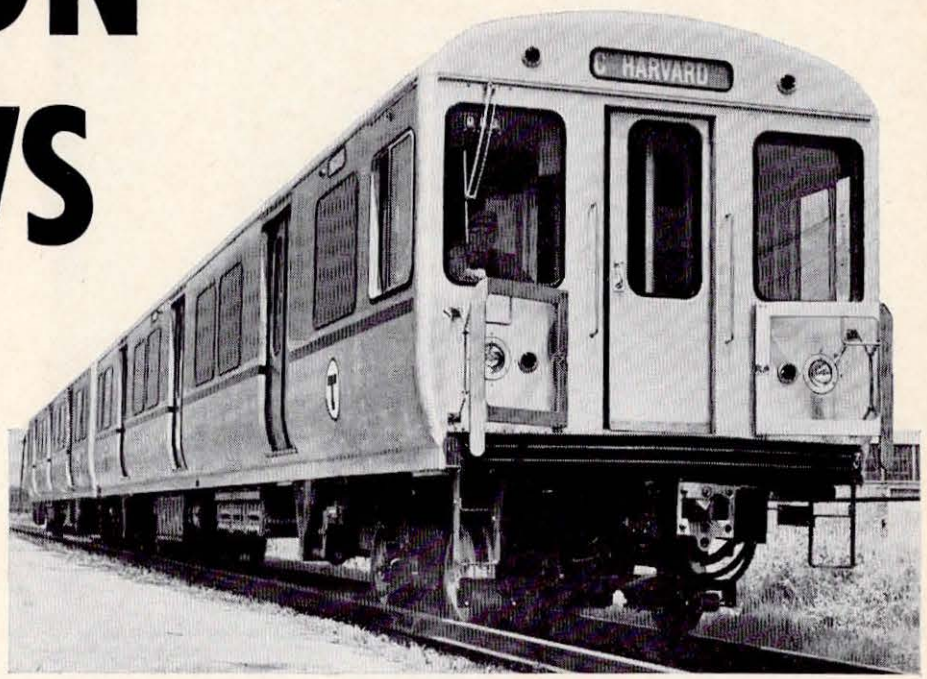
An entirely different approach was suggested by W. Arthur Grotz several years ago when he was president of Western Maryland. He would have the railroads sell their track and related fixtures to the government and lease them back. The facilities would be operated and maintained by the railroads. "Rentals," he said "should reflect the public interest in strengthening the railroad system and the fact that maintenance would be done by the lessees . . . . Improvements would be financed by government and rentals adjusted accordingly."

● **No "great bonanza."** But there is the possibility that any government aid will be saddled with conditions that railroads may find hard to accept or meet. This thought is suggested by comments made by James W. Diffenderfer, assistant vice president, special services, Penn Central, in an address before the AREA.

His comments reviewed the road's experience with the Metroliners and the work of preparing the line between Washington and New York for the operation of these trains. As part of the contract between the railroad and the Federal government, the government was to contribute $9.6 million toward the cost of the work. ". . . The need to satisfy the whims of Federal bureaucracy" was cited by Diffenderfer as a problem in the fulfillment of the contract. He mentioned this "as a warning to any who have ideas of seeking similar arrangements with thoughts of obtaining a great bonanza. . ."

Indeed, if any government help is to be forthcoming to railroads in the area of track maintenance it is not likely to materialize in the foreseeable future. Meanwhile, railroads will have to rely on their own resources in building up tracks to the standards required by circumstances and government regulations. ■

BOSTON SHOWS (T)HE WAY



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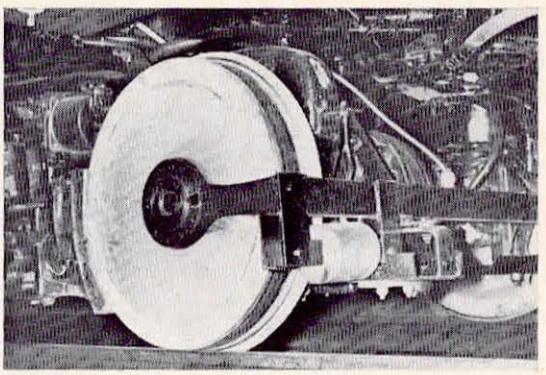
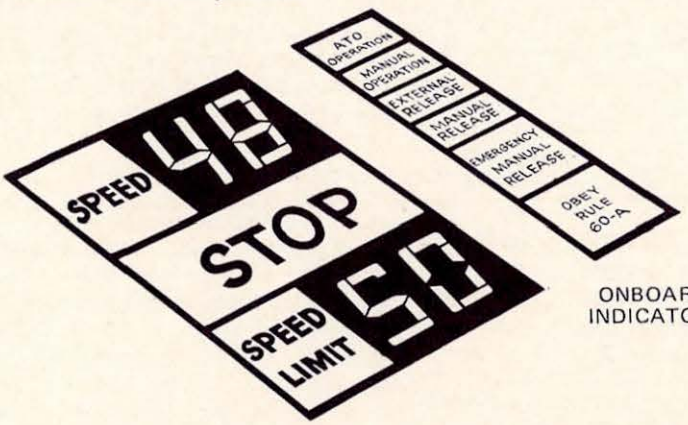
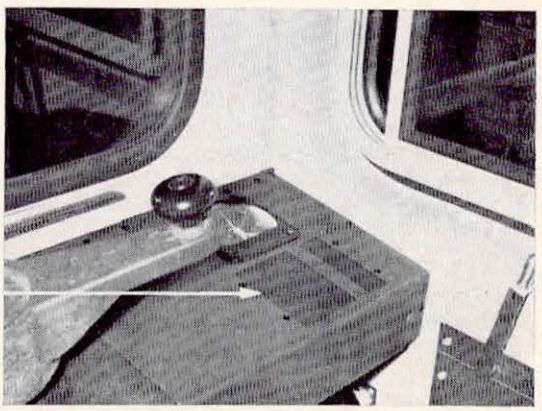


Receiver coils at each end of a car receive commands inductively from the rails.



ONBOARD INDICATOR



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ACI routing of trains at a key junction and automatic monitoring of bus operations are two of the newest systems employed by Chicago Transit Authority to improve its service.

● **Busy junction.** At one of its busiest rapid-transit junctions, Tower 12 at the southeast corner of the Loop (Van Buren and Wabash), CTA is providing automatic routing for its Dan Ryan median-strip trains. Mixed in with Loop shuttle runs and Evanston expresses, the DR trains are correctly routed using automatic car identification (ACI). This junction handles 40 trains per hour southbound, where automatic route selection is used over a facing point switch. Northbound moves—34 trains per hour—are over a trailing-point switch. Here, route selection is relatively simple—first train to occupy the approach to the interlocking gets the plant.

But for southbound moves, Evanston trains and "Loopers" (Loop shuttle trains) operate over the facing-point switch reversed, and Dan Ryan trains operate over the switch normal. To reduce total car labeling to a minimum, Dan Ryan trains are equipped with ACI labels. The labels are white retroreflective horizontal stripes (wide stripe is a one, and narrow stripe is a zero). The WABCO laser ACI system is used with vertical scanning. Labels are applied to a panel on the first door of a married-pair car and to the rear door of the other car in the pair. One label, at the front, contains the route number. The trailing label contains the car number.

In operation, the facing-point switch at the junction is normally lined reverse for Loopers and Evanston trains. When a Dan Ryan train approaches, the ACI scanner reads the route label. This information is sent in real-time to the interlocking controls. If no conflicting routes are lined, the controls normal the switch, and the Dan Ryan train receives a clear signal to proceed.

● **System use can be expanded.** At present, only routing information is used. But plans have been completed to send car number information to CTA's computer in the Merchandise Mart where maintenance scheduling data can be compiled. Provision has already been made in the ACI controls for sending car numbers to a Teletype unit at CTA headquarters. A hard copy and a paper tape would be produced, the latter for input to the computer.

To eliminate or reduce vandalism to labels, they are mounted on folding door panels. When opening, the doors turn inward, so that the label is inside the car out of reach of anyone standing on the platform.

CTA's second new service-improvement system, Monitor-CTA, combines the technologies of two-way radio, electronics and on-line, real-time computing to provide data for control of 500 buses. The primary purpose of this project is to furnish a constant flow of information to transit management so as to improve schedules and routes, to provide two-way digital and voice communication with buses, and to automatically monitor bus location and identity in the Chicago metropolitan area.

"As a bonus, the system also features a safety emergency notification system. With this equipment, the driver can report accidents and robberies, and in special instances mechanical breakdowns," said Carlos C. Villarreal, administrator of the Urban Mass Transportation Administration, at dedication ceremonies in Chicago last month. Monitor-CTA is a $2-million demonstration grant project. UMTA is providing $1,549,000 and CTA the balance of $451,000.

● **Owl service now.** The demonstration-grant project covers 500 of CTA's 3,300 buses, but the system could be expanded to include the entire fleet. Presently, the 500 buses comprise CTA's "owl service" fleet that operates between midnight and 5 a.m.

The Monitor-CTA project consists of a computerized vehicle-location-and-identity system that will monitor bus schedules; a silent alarm radio system that will instantly transmit the location, bus and run numbers of an operator in need of help; and a two-way radio system that will provide full-time communications between the bus operator and a central dispatcher.

At various points along bus routes there are low-powered radio transmitters, called "electronic signposts." Each signpost is assigned an identification number, which is constantly being transmitted at sufficient power to reach a passing bus. The signposts are usually mounted near the street, on traffic signal standards or controller boxes. A passing bus receives this radio signal and stores the identity number, and a timer begins counting as the bus leaves the vicinity of the signpost.

Meanwhile, at the Merchandise Mart control center of CTA, a General Elec-

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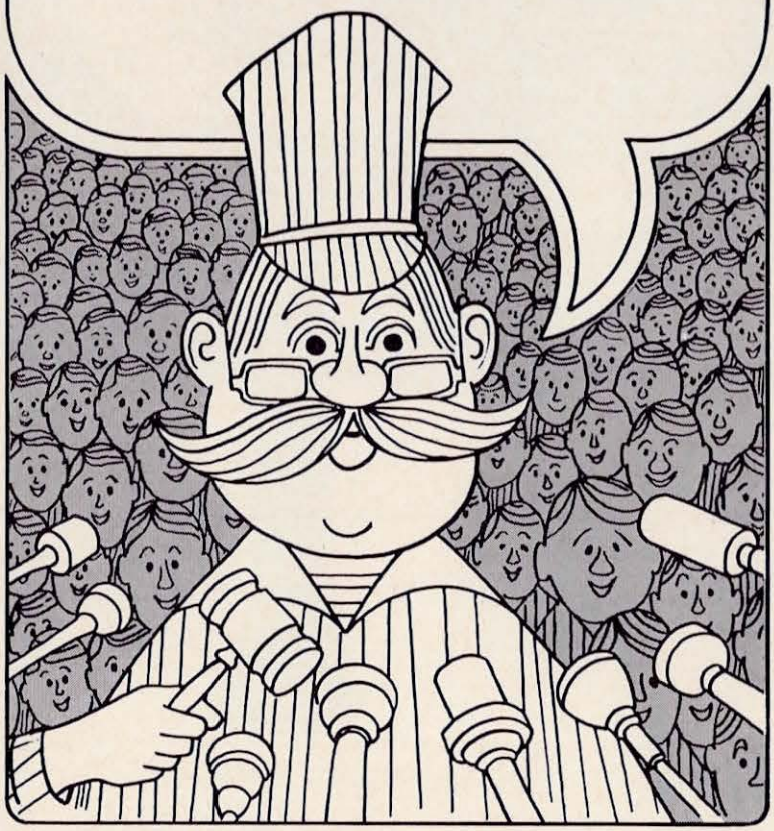

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Circle 22 on coupon page 69

tric process automation computer GE/PAC 4020 interrogates a different bus every 83.33 milliseconds. Via a central radio transmitter, a coded identification of a specific bus is broadcast to all 500 buses. But only the bus with the specific identification number will respond. Upon receiving its identification numbers, the bus radio transmitter will send out the last signpost identification and the elapsed time since passing that signpost. Because of the low power of the bus radio, satellite radio receivers are strategically located in the north and south sections of the city to pick up bus messages. Then via wire line bus messages are sent to the computer.

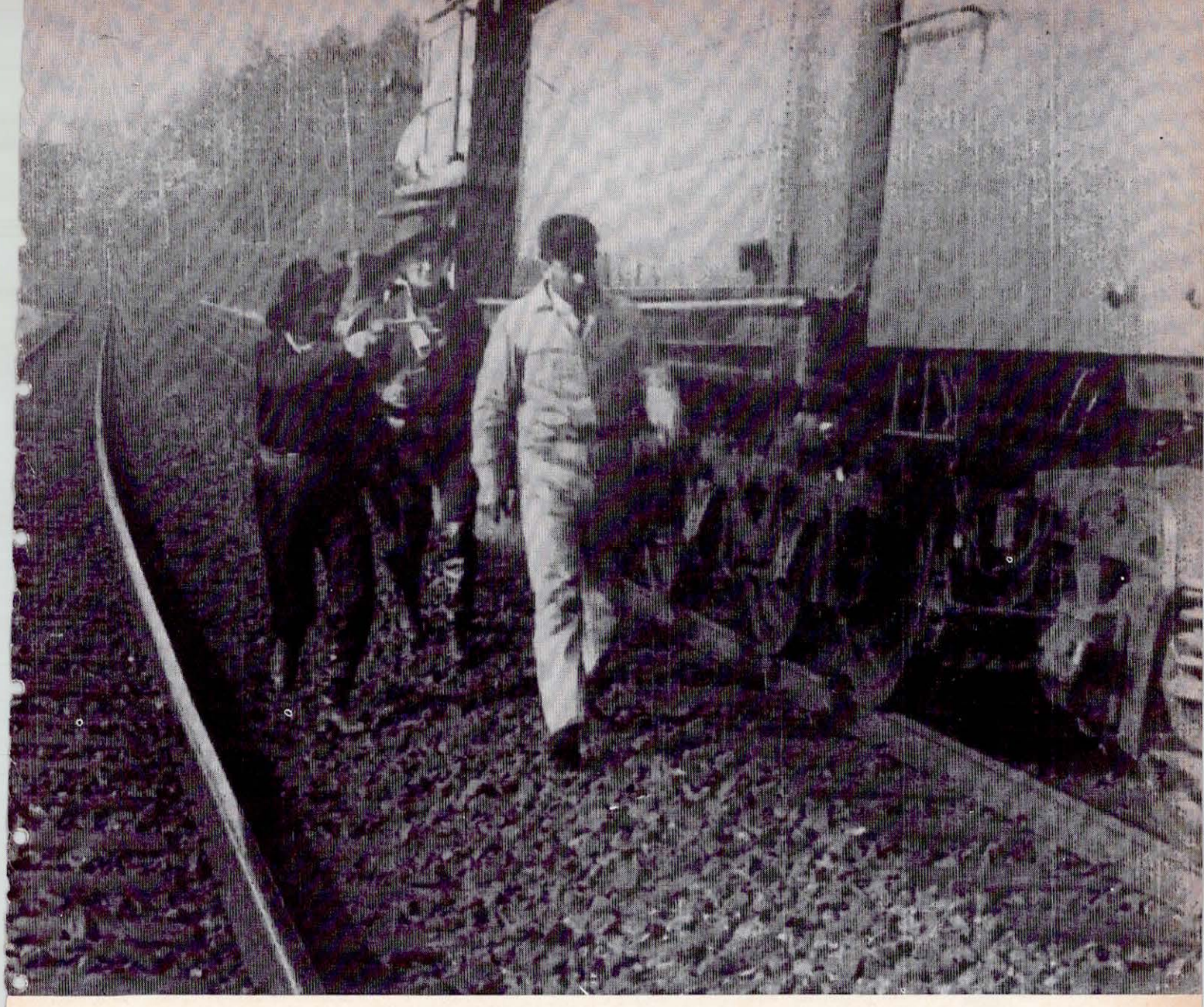
● **Schedule tolerance.** The computer checks the bus message against the schedule for that bus. If the bus is off schedule above or below a preset tolerance, information is displayed to the dispatcher on a cathode ray tube unit. On the CRT will be shown the run number, route name, signpost location, direction of travel and time deviation. By two-way radio, the dispatcher can call the bus operator and advise him as to how to meet the schedule.

All buses are equipped with two-way radios to enable operators to call the dispatcher. When the operator presses the push-to-talk button in his radio handset, the equipment automatically transmits his identification. The dispatcher can initiate calls to buses by dialing the run number on a telephone-type dial. His signal is radioed to the buses. Again, only the specific bus with that identity will respond and the operator will hear an audible alarm.

● **Emergency alarm.** In an emergency, such as passenger disturbances or robberies, the bus operator can push a special footswitch which will cause the bus radio to transmit (continuously for two minutes) its identification and location (last signpost passed and elapsed time). This information will be displayed on the dispatcher's CRT unit, and a buzzer will sound to alert him. He has a direct telephone line to police headquarters communications center where a radio call can be made to the nearest police cars to assist the bus operator. During this alarm transmission from the bus, there is no audible or visual indication of any equipment operation on the bus.

The radio equipment on the buses, base stations, signpost units and the dispatcher's console were furnished by Motorola Communications & Electronics, Inc., lowest of three bidders for the UMTA demonstration grant project.

The computer maintains records of all interrogations and responses of the buses, as well as of action taken to alleviate delays or breakdowns of buses. ■



"Never you mind 'bout that new Servo display system you're gettin' next month—right now, start walkin' and don't stop till you find the hot box!"

EVEN without the guns pointed at him, our railroad friend's task of "walking the train" to find a hot journal box was not an enviable one. It certainly would have been simpler and quicker if he did have our new SERVOLARM® Trackside Hot Box Visual Display System.

Designed to operate with a standard SERVOSAFE® Hot Box Detector System, the SERVOLARM visually signals the presence of a hot journal box and also pinpoints its location by means of a digital readout axle count. SERVOLARM helps to eliminate train stops and crew delays. It simplifies and speeds up the entire hot box location procedure by directly notifying the crew via a trackside display board.

SERVOLARM can be quickly and easily installed with a minimum of construction equipment and labor, while eliminating long-distance wiring and extensive communication equipment costs. Compared to other, more complex methods of communication, SERVOLARM offers greater reliability and reduced maintenance.

Are you tired of looking for hot boxes the hard way? Take a look at SERVOLARM—just ask for Tech Data Publication 2013.

Bi-directional display board presents digital readout, showing axle count location of hot journal box. If no hot boxes are detected, display board reads "000". Flashing signal lamps on top indicate presence of hot box.

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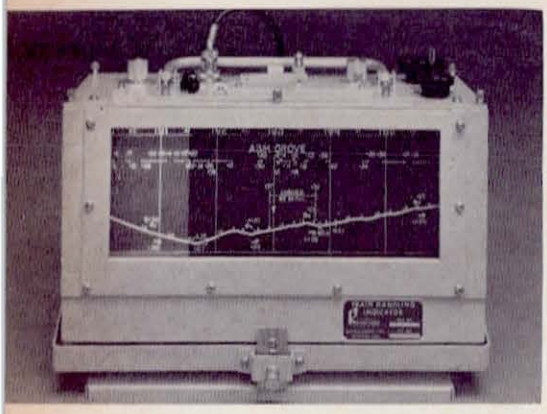
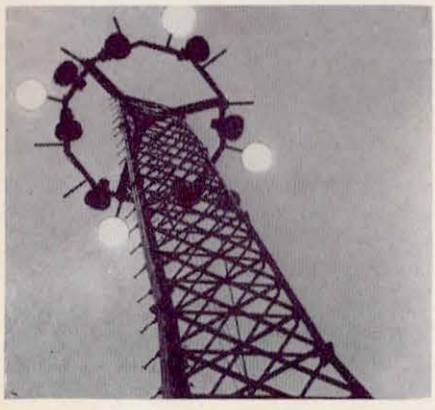
New Products Report



Train handling indicator (RA-1)

Safer, more efficient train handling is realized with use of a device called Train Handling Indicator (THI). Designed to be mounted in the lead locomotive, THI gives train engineers a continuously moving pictorial display that shows the exact position of any length train relative to track data, which is represented by a track profile tape within the indicator. (The pictorial display measures 4¼ by 12 in.) The polyester-film profile tape contains information about signals, bridges, mileposts, speed restriction zones, and curve location and length.

The moving display shows as much as five miles of upcoming track at a time (RA, Dec. 22/29, 1969, p. 62). It is synchronized to actual train speed through a speed controller mechanism, which is supplied with the indicator. Track ahead is shown in red on the tape; train length is shown in white. The indicator is 9¼ in. high, 15 in. wide, 6 9/16 in. deep, and weighs 24 lb. The speed controller is 5⅜ in. high, 6⅛ in. wide, 7¼ in. deep, and weighs 7 lb. *Reflectone, Inc.*

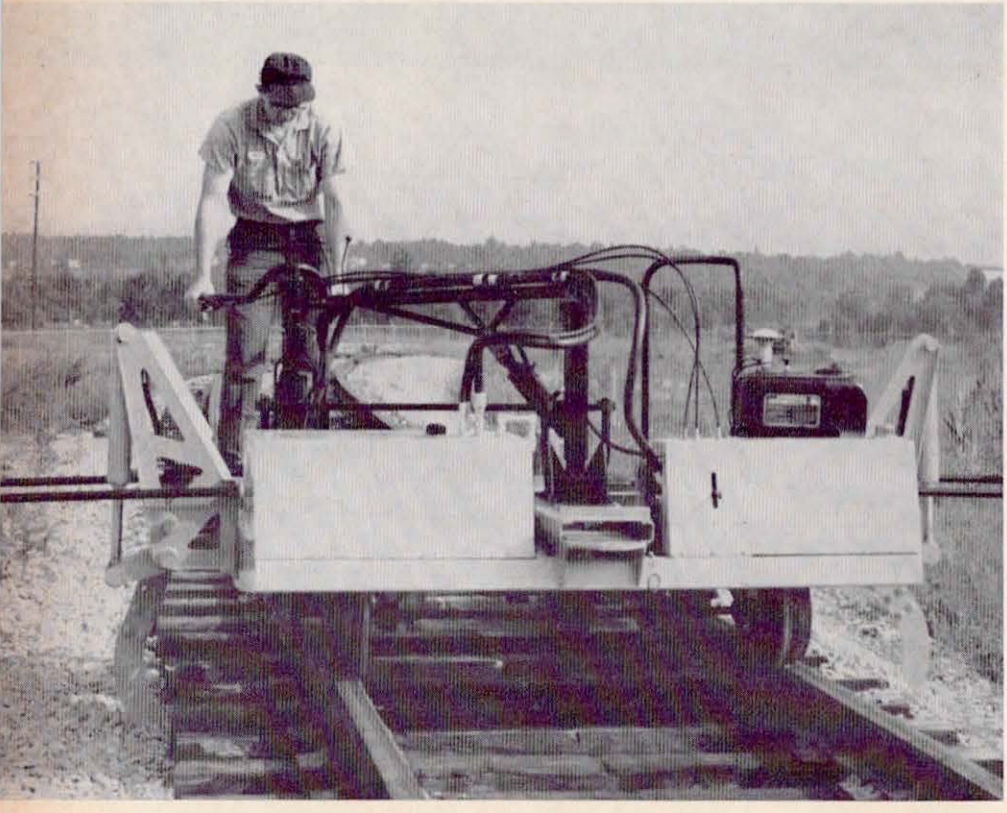


High lighting (RA-2)

In addition to giving a higher footcandle level, the increased mounting height of the HM-1000 luminaire allows poles or towers to be set further back from traffic and permits wider spacing. Ballast housing accommodates three light sources—1000-watt Metal Halide, 1000-watt Mercury, or 400-watt Lucalox. Luminaries' activated charcoal filtered optical assembly and a positive wire lamp grip are said to give maximum lamp protection from vibration. *General Electric.*

Liquid level sensor (RA-3)

The sensor of the Metriswitch, a material level filling control for liquids, slurries and granular solids, is mounted on tank roof or attached to a nozzle fitting. A single sensing element, about 25 in. long, can be used in material that will flow, and the alarm trip point can be adjusted by the addition of standard 1-in. NPT pipe lengths. Two signal lead wires extend from sensor to one or more remote alarm locations. No line power is needed at tank location. *Metritape Controls.*



Spike driver (RA-4)

A new self-propelled hydraulic spike driver is said to deliver 1800 hammer blows of 80-foot pounds each per minute for driving spikes home in about one second. It handles up to 90 ties per hour.

To conserve power and avoid overdrive, an automatic trigger-valve starts the hammer action as the hammer touches the spike, then cuts off the action as soon as the spike is down to the desired level.

The unit, designed for one-man operation, has a traveling speed of 10.6 mph. All controls are readily reached from the operator's platform. It includes a hydraulic-powered tie nipper that locks under both ends of the tie and holds it firmly against the rail while spikes are being driven.

It is powered by an 18-hp Wisconsin air-cooled, four-cycle gasoline engine driving a vane-type hydraulic pump directly mounted on the engine and coupled to it through a gear train. Propulsion is transmitted through a hydraulic motor and gear box to the front axle. *Tamper, Inc.*

Speed indicator (RA-5)

A digital speed indicator, the Speed-Log, is designed to withstand the conditions imposed on such instruments by the locomotive environment while giving precise velocity indications in tenths of a mile per hour to 10 mph and in miles per hour from 10 to 199 mph. The new model features an advanced numerical readout tube.

Speeds are displayed in simple, easily read numerals of uniform brightness behind a curved lens intended to eliminate undesirable glare and misinterpretation from angular distortion of fluctuations.

Each numeral in the numerical indicator is made up of a single and separate element, thus entirely eliminating the possibility of a false readout due to a malfunction.

Speed-Log is completely electronic with integrated circuitry, having no mechanical parts to wear or lose calibration. The cabinet houses both indicator and control components which are shock mounted. An adjustable bracket allows the indicator to be positioned for optimum viewing. *Vapor Corp.*

Carry loader (RA-6)

A new machine is said to offer the potential for a lower-cost-per-ton of material moved by combining the loading and hauling functions in one operation. Called the 988 Carry Loader, the unit has a rear-mounted bucket and the normal front-mounted bucket. It provides twice the carrying capacity of the standard 988 Wheel Loader.

The Carry Loader, with 325 flywheel horsepower, is specifically designed to load both buckets from a pit face or stockpile and to economically transport the material up to 2,500 feet over one way and dump into a ground-level hopper or other receiving device. The 6-cu-yd rock bucket or the 6.5-cu-yd general-purpose bucket can be used.

The hydraulic system is completely sealed with valves enclosed in the 63-gallon tank to insure long component life. Two double-section, vane-type pumps, driven off the engine flywheel, supply flow for the steering and implement circuits. Each bucket has a separate set of levers and valves to control lift and tilt. *Caterpillar Tractor Co.*

High-strength steel (RA-7)

Three new grades of high-strength quenched and tempered steel plates have been announced. These are identified as RQ-100, RQC-90 and RQC-100. RQ-100 is a roller-quenched and tempered alloy steel.

RQC-90 is a roller-quenched and tempered carbon steel produced to a 90,000 psi minimum yield strength in plate thicknesses from 3/16 inch to 1¼ inches, inclusive. RQC-100 is a roller-quenched and tempered carbon steel.

Because of excellent notch toughness, the new quenched and tempered steels are said to be well-suited for applications where a combination of high strength, abrasion resistance and low temperature service is required. The new steels are expected to be used in the manufacture of heavy construction equipment, bridges, buildings and truck frames. *Bethlehem Steel Corp.*

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People in the News

Benedict Bouzan
CP

G. A. Morison
CP

Kenneth K. Blyth
C&O

Robert L. Hintz
C&O-B&O

Robert P. Cornwell
GTW

James W. Wiggins
MeC

CANADIAN NATIONAL.—R. P. Langlois, manager of customer research services, St. Lawrence Region, appointed chemical engineer, industrial development branch, Montreal.

D. E. Todd, assistant to manager, public relations, St. Lawrence Region, promoted to assistant manager, public relations of that region, Montreal.

J. Horrocks, comptroller, CN Hotels, appointed regional comptroller, St. Lawrence Region, Montreal, succeeding **J. L. Ball,** promoted to Accounting & Finance Department, system headquarters.

T. L. Jamieson, assistant superintendent safety and fire prevention, promoted to superintendent of safety—system, Montreal, succeeding **J. R. Bannerman,** retired.

T. H. Pinck, who has been replacing **R. S. MacKay** on a temporary basis since July 21, has been appointed co-ordinator loss and damage prevention, Great Lakes Region, Toronto.

CANADIAN NATIONAL-GRAND TRUNK.—Harold B. Lynch named district sales manager, Kansas City, Mo., succeeding **John C. Grantz,** promoted. **James A. Ridout** appointed district sales manager, Seattle, to succeed **Walter L. Scott,** retired.

CANADIAN PACIFIC.—Benedict Bouzan appointed chief architect, with responsibility for architecture, interior design, mechanical and electrical engineering, Montreal. **T. J. Boyle,** engineer of bridges, named engineer of bridges and structures, with responsibility for planning, estimating of bridges; structural engineering for bridges, buildings and other structures. **G. A. Morison,** engineer of buildings, named engineer of project planning and control, in charge of estimating, contracts and construction management, project scheduling in collaboration with chief architect and engineer of bridges and structures. **J. S. Smith,** engineer special projects, appointed special assistant—engineering economics, network control methods, engineering computer systems, analyses, special studies.

M. Chabot appointed assistant superintendent, Laurentian Division, Trois Rivieres, Que., succeeding **J. E. Gendron,** transferred. **L. R. Vachon** succeeds Mr. Chabot as general agent, Quebec.

CHESAPEAKE & OHIO. — Kenneth K. Blyth, manager—automotive sales, Detroit, named regional sales manager there, succeeding **J. Parker Donovan,** who has retired after 47 years of service. **Peter D. DeHamer,** assistant regional sales manager, Detroit, succeeds Mr. Blyth as manager—automotive sales.

CHESAPEAKE & OHIO—BALTIMORE & OHIO.—Robert L. Hintz, director of accounting, appointed comptroller. **Bruce G. Lawler,** assistant comptroller, named deputy comptroller. Their headquarters will remain in Baltimore.

R. E. Perry, terminal trainmaster, Clifton Forge, Va., named assistant superintendent, Chicago. **Marshall Walthall,** assistant trainmaster, Clifton Forge, promoted to terminal trainmaster there. **J. D. Jackson,** terminal trainmaster, South Charleston, named assistant superintendent, Clifton Forge. **Robert L. Sams,** supervisor of locomotive operations, named trainmaster. **C. J. Wright,** engineer, appointed assistant road foreman of engines—assistant trainmaster. **Loren G. Adkins,** assistant trainmaster, St. Albans, W.Va., succeeds Mr. Jackson at South Charleston. **A. N. Lusk,** assistant to trainmaster, Huntington, named assistant trainmaster, St. Albans. **H. R. Samples,** yardmaster, Grafton, W.Va., named superintendent of safety and fire prevention there.

CHICAGO & NORTH WESTERN.—J. D. Lines appointed assistant vice president-training and development. **R. L. Wilson** named assistant vice president-personnel services.

Robert L. Benton named market manager-lumber and construction materials; **James B. Goinz,** market manager-government; **John P. Toren,** market manager-primary metals.

DELAWARE & HUDSON.—Thomas W. Eagan, general assistant, accounting department, Albany, N.Y., named general accountant, succeeding the late **E. J. Moy.**

DENVER & RIO GRANDE WESTERN.—R. L. Taylor named director TOFC and government traffic, Denver, succeeding **J. B. Norwood, Jr.,** advanced to director service planning and TOFC (RA, Sept. 15/22, 1969, p. 88).

DEPARTMENT OF TRANSPORTATION—Dr. Robert A. Hemmes, associate professor of industrial engineering, Stanford University, has been appointed assistant administrator for research, Urban Mass Transportation Administration, DOT.

DETROIT, TOLEDO & IRONTON.—L. W. Klenk, traffic manager—sales, Dearborn, Mich., appointed general sales manager there. **R. J. Gunton** appointed traffic manager sales—east at Dearborn. **C. L. Froehlich** named traffic manager sales—west at Chicago.

DULUTH, MISSABE & IRON RANGE.—Joseph E. Arado named to the newly created position of director of industrial development. Mr. Arado will continue as director of industrial development, **Elgin, Joliet & Eastern.**

FORT WORTH & DENVER.—Norman G. Brooks appointed to the newly created position of manager, industrial development and real estate, Fort Worth, Tex. **Macyl K. Orman** succeeds Mr. Brooks as land and tax commissioner. Abolished position of agricultural and tax agent formerly held by Mr. Orman.

GRAND TRUNK WESTERN.—Robert P. Cornwell, manager of real estate and industrial development, named to the newly established position of projects director.

ILLINOIS TERMINAL.—T. S. Belew named superintendent-Southern District, McKinley Yard; **F. S. Jenkins,** superintendent-Northern District, Decatur, Ill.; **E. J. Sullivan,** superintendent-Central District, Federal, Ill. **B. J. Goodrich** and **D. S. Theroff** named trainmasters, McKinley Yard, (Madison), Ill., and Federal, Ill., respectively.

E. F. Moore named director-security and special services, St. Louis.

LONG ISLAND.—George Thune, former managing editor, Long Island Commercial Review, has joined the LI as manager-press relations, Jamaica, N.Y., reporting to **Hank Boerner,** director of public relations and community affairs.

LOUISVILLE & NASHVILLE.—Russell S. Cook appointed manager, cost develop-

(Continued on page 74)

Put Stanray components where the stress is, and lengthen box car life

X-Panel roof

Two of the greatest stresses a box car roof is subject to is twisting and racking. The X-panel roof is designed to provide maximum resistance to these stresses at minimum cost. Standard's new roof has panels 61¼" wide instead of the normal 41", which result in approximately 33% fewer seam caps. It also means less chance of leakage.

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Standard can furnish a Coupler Operating Device to suit any coupler travel from normal draft gear conditions to cushioned underframes with as much as 60" travel. At the same time, Standard furnishes a Coupler Operating Device to suit any striker opening required for the custom underframe specified.

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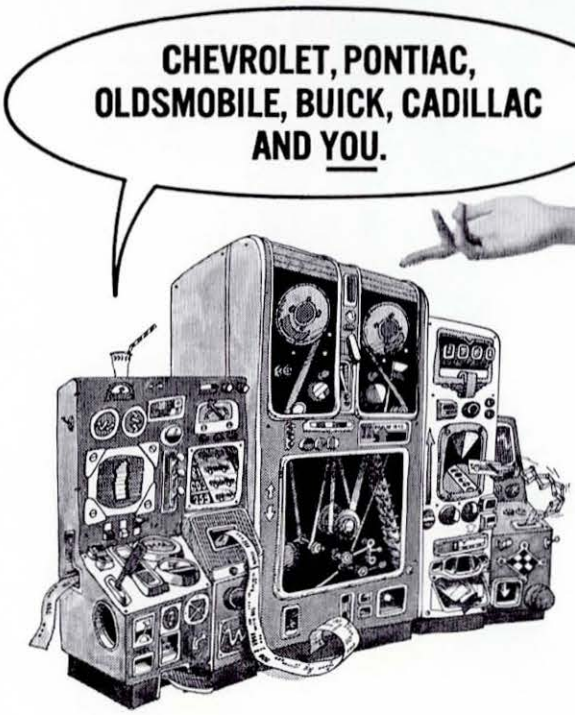

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LETTERS

Rates vs slogans

Washington, D.C.

To the Editor:

In the March 9 issue of Railway Age you credit the Illinois Central with pioneering in the field of maximum rates in box cars. While I am willing to admit that the Illinois Central pioneered with the term "Maxi-Rate," I would like to point out that these rates resulted from considerable research effort by Southern Railway which proposed the rates for application within the South on Sept. 10, 1968. The scale was approved by the Southern carriers and the proposed rates went into effect in Southern Freight Association Territory on March 11, 1969. The Illinois Central proposed to extend the SFA rates into the other territories it serves at a somewhat later date, and its rates were ordered investigated on Oct. 14, 1969.

As I say, I do not wish to deprecate the Illinois Central's advertising slogans, but innovation in slogans is somewhat different than innovation in rates; and, while the Illinois Central has been an innovator, other railroads have done their part as well.

R. S. Hamilton
Vice President
Southern Railway System

San Francisco's streetcar

Philadelphia, Pa.

To the Editor:

Thank you very much for your wonderful article about San Francisco's new streetcar in your March 9 issue, p. 30. This is the first time anything has been said about this in the trade press, so I can congratulate you on your scoop of the news.

Louis T. Klauder
Louis T. Klauder and Associates

Railroads and the paper industry

New York, N. Y.

To the Editor:

I thoroughly enjoyed reading the article which you prepared covering Kimberly-Clark's relationship and reliability upon the nation's railroads for services (RA, Feb. 23, p. 31).

This is a very informative article and serves as an illustration of the needs of the paper industry for services and an adequate supply of equipment to meet the ever growing demands of our customers.

I hope the information which you developed is given careful consideration by responsible officers of the United States railroads.

M. J. Walsh, Jr.
Assistant Vice President
St. Regis Paper Company

Scrap shippers

Washington, D.C.

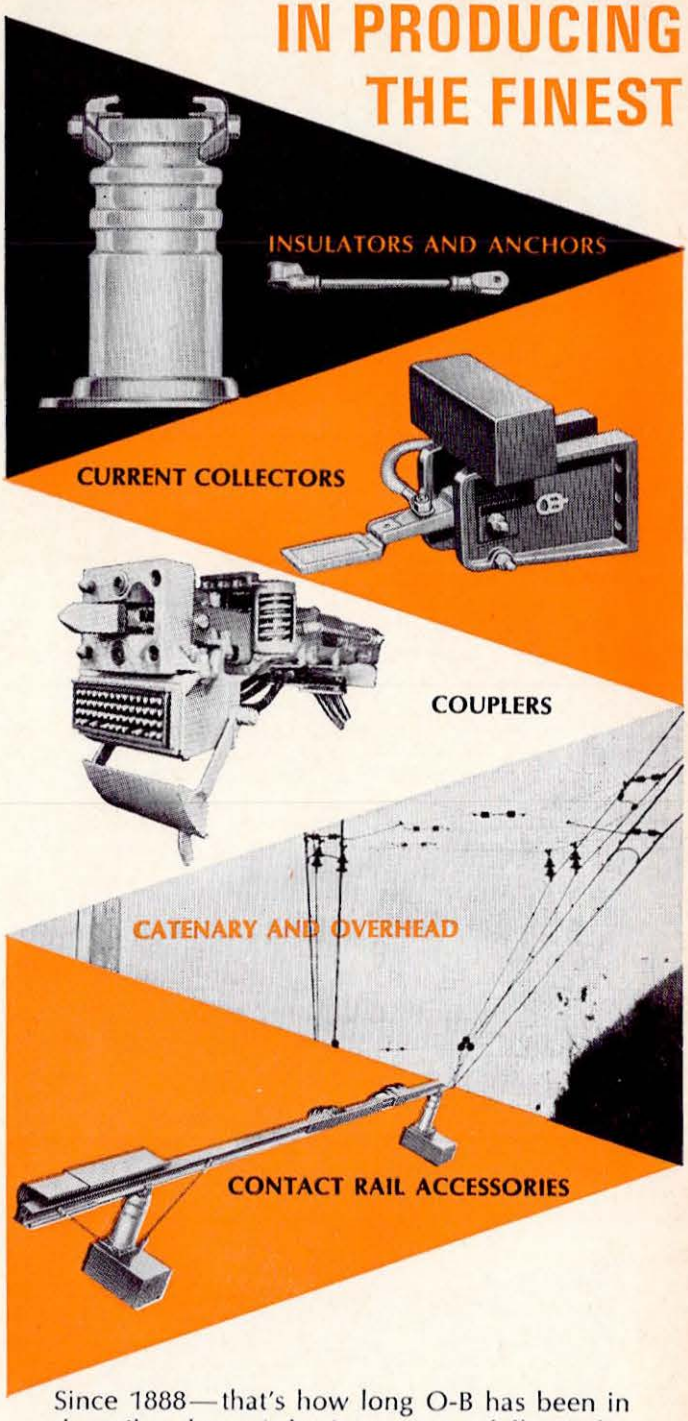
To the Editor:

Congratulations to Railway Age and Frank Malone on the excellent piece concerning the problems facing iron and steel scrap shippers.

Mr. Malone's objective reporting and Railway Age's courage in publishing such a hard-hitting article about the industry which it serves is an outstanding tribute to the journalistic profession.

William S. Story
Executive Vice President
Institute of Scrap Iron & Steel, Inc.

81 YEARS OF SUCCESS IN PRODUCING THE FINEST



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Arnold J. Travis
MeC

H. E. Buchheim
MeC

Jack H. Hieger
M-K-T

John H. Hughes
M-K-T

(Continued from page 70)

ment, office of economic planning and budget administration, Louisville.

Otis W. Steffey, office manager, office of chief engineer, named assistant to engineer maintenance of way, Louisville.

Personnel department redesignated as personnel and labor relations department. **Wayne R. Lindahl**, assistant comptroller, named to the newly created position of director-salary administration. **W. C. Moore, H. R. Stewart** and **W. T. Wallace,** assistant directors of personnel, become directors of labor relations. **A. D. Humphrey, C. D. Epperson, A. J. Reilly** and **R. E. Poe,** assistants to director of personnel, become managers of labor relations. **B. H. West, J. W. Shaughnessy, J. T. Williams** and **R. O. Key,** staff assistants, become managers of labor relations.

Woodson Knight, public relations manager, named public relations director, Louisville.

MAINE CENTRAL.—James W. Wiggins, vice president—engineering and transportation, Portland, Me., named vice president—operations, with jurisdiction over the engineering, operating and mechanical departments. **Arnold J. Travis,** assistant general manager, appointed assistant to the president. Mr. Travis will assume direction of the Car Service Department, acting as liaison with the Interstate Commerce Commission, Association of American Railroads and other rail lines for MeC car requirements. **Herman E. Buchheim,** director of sales, appointed to the newly created post of assistant vice president—sales and service. **Roy E. Baker,** vice president—special projects, retired March 1, after more than 44 years of service.

MISSOURI-KANSAS-TEXAS.—Jack H. Hieger, assistant general rate manager, St. Louis, appointed assistant vice president-rates there, to succeed **Lou E. Mitchell,** who retired Mar. 1.

John H. Hughes, engineer maintenance of way, appointed chief engineer, with headquarters remaining at Denison, Tex.

MISSOURI PACIFIC-TEXAS & PACIFIC.—John T. Heidenreich and **Robert L. Barley** named to newly created positions in the Information and Control Systems Department, St. Louis. Mr. Heidenreich, formerly manager-data processing promoted to manager-data center operations and services, and Mr. Barley, formerly a management consultant, **Auerbach Corp.,** named manager-systems analysis and programming.

C. T. Spencer, general agent, Milwaukee, appointed assistant traffic manager, truck-rail and merchandise sales, St. Louis. **W. E. Horner,** assistant general agent, St. Louis, replaces Mr. Spencer.

NORFOLK & WESTERN.—Robert L. Fehlber, assistant vice president—pricing and marketing, Roanoke, Va., appointed assistant vice president—traffic there, succeeding **Frank P. Scharffenberger,** who has retired after a 50-year railroad career. **Raymond H. Hill, Jr.,** general freight traffic manager—pricing, Roanoke, promoted to systems manager—pricing and marketing there.

Oliver H. Crawford, chief photographer for the N&W Magazine, Roanoke, Va., named manager photographic services for

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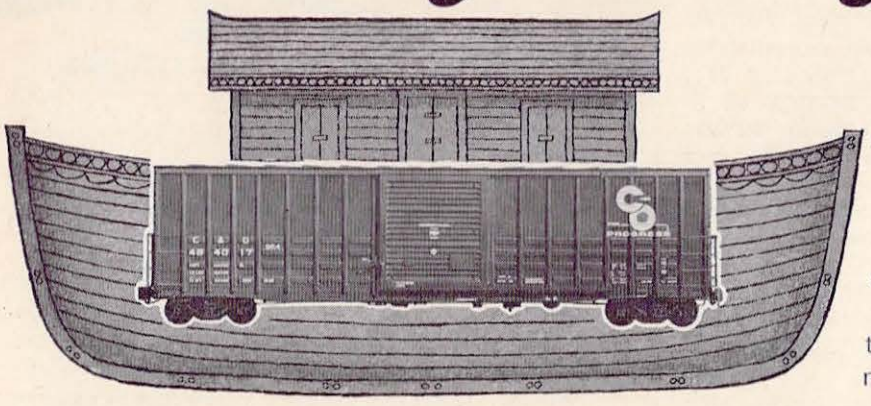

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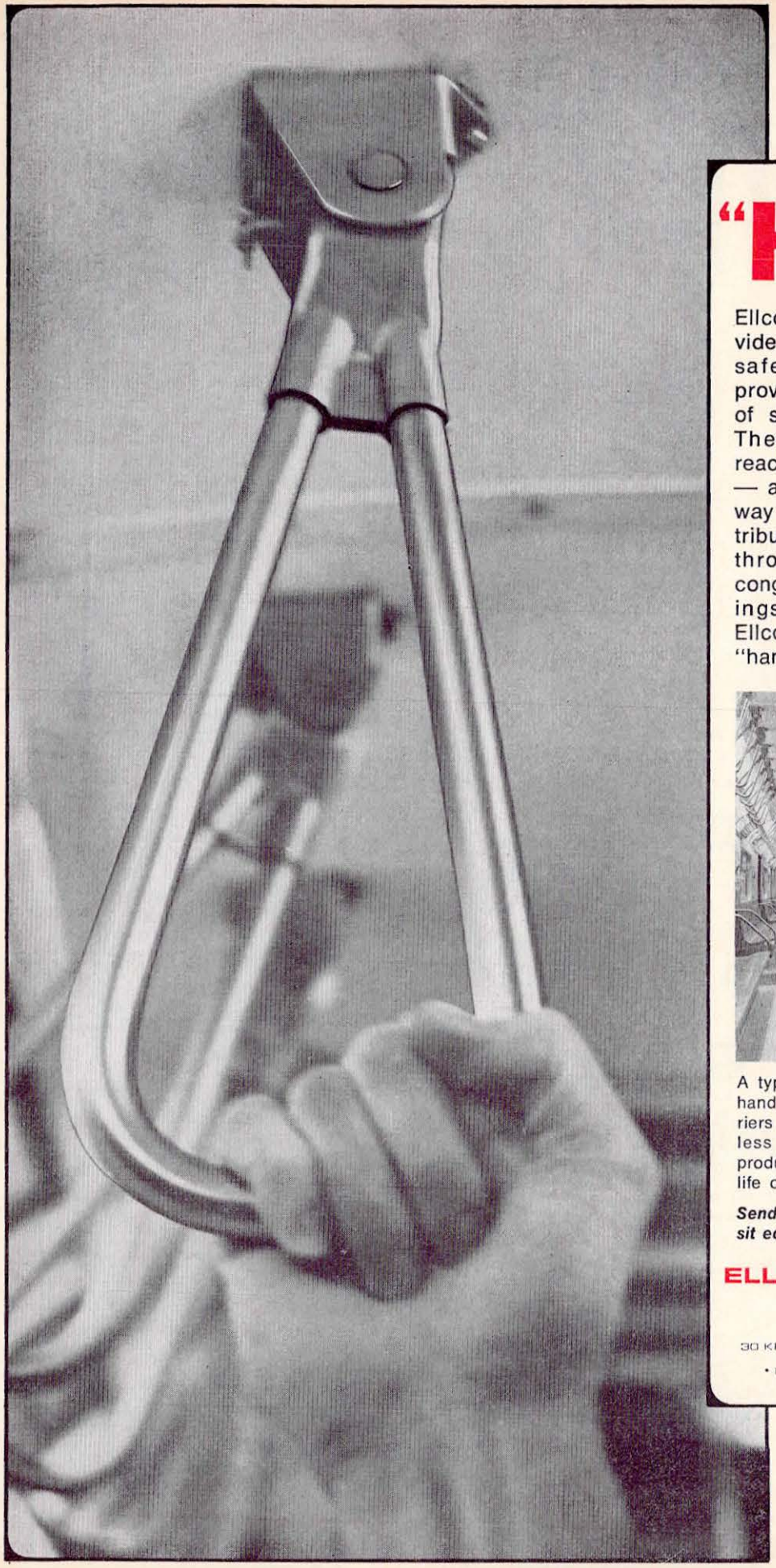

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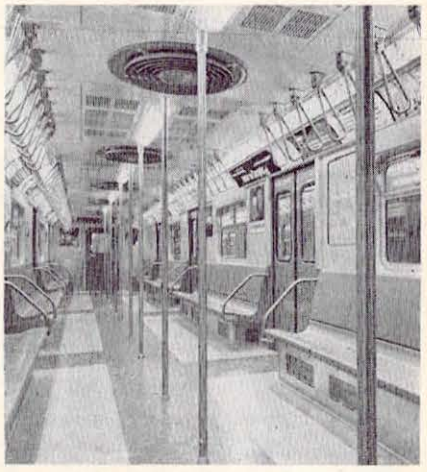

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Circle 26 on coupon page 69

Edward A. Kaier
PC

Wm. C. Wieters
PC

Frank Aikman, Jr.
RS&C Suppliers

Wm. H. Moore
Southern

Wm. V. Burke
Southern

Robt. S. Hamilton
Southern

the N&W, succeeding **J. D. Kanode**, retired. **Aubrey L. Overstreet,** photographer, promoted to assistant manager photographic services.

PENN CENTRAL.—Edward A. Kaier, general counsel, Philadelphia, appointed vice president and general counsel on April 1.

Robert C. Marquis, director-freight car utilization, Philadelphia, appointed assistant vice president–freight car utilization.

William C. Wieters, assistant general manager–special assignments on the staff of **James A. McDonald,** executive vice president, Philadelphia, has been promoted to general manager-special duties on that staff.

R. Thomas Schoonmaker named manager–market development for the construction industry. He joins a group of PC specialists who are responsible for developing services and programs that satisfy shippers' needs for rail transportation. Mr. Schoonmaker will specialize in the transportation of construction materials, such as lumber, cement, sand, gravel and stone.

Allan B. Cravens appointed superintendent of transportation, Western Region, Chicago. He held the same position in the former Lake Region (now part of the Western Region).

Ronald A. Wisthuff named regional industrial engineer, Western Region, Chicago, succeeding **Lawrence E. Williams, Jr.,** transferred to the New York Region. Mr. Wisthuff held the same position in the former Lake Region, with headquarters in Cleveland.

RAILWAY SIGNAL & COMMUNICATIONS SUPPLIERS ASSOCIATION.—Frank Aikman, Jr., elected executive director and secretary-treasurer and a member of the board of directors, succeeding **Arthur H. Smith,** resigned. Mr. Aikman retired as president, **Long Island,** last August. On April 1 the Association moved to new quarters at the Statler Hilton Hotel, 401 Seventh Avenue, Second Office Floor Room 62, New York, N.Y. 10001, from 170 Broadway.

SOUTHERN.—In a realignment of responsibilities, five executive vice presidents have been named at Washington, D.C. **William H. Moore,** vice president–operations, will be executive vice president–operations. **William V. Burke,** vice president–sales, named executive vice president–public affairs. Mr. Burke will be accountable for all field sales activities, community relations, general public relations and advertising. **Robert S. Hamilton,** vice president–marketing and planning, appointed executive vice president–marketing and planning. **James H. McGlothlin,** vice president–law, named executive vice president–law and finance. **George S. Paul,** vice president–personnel, named executive vice president–administration.

L. Stanley Crane, vice president–en-

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gineering, will supervise the maintenance of way, mechanical, communications and signal and electrical departments, in addition to his former engineering and research activities. Mr. Crane will report to Mr. Moore.

James S. Crow, vice president–finance, and **William R. Divine,** vice president–accounting and comptroller, will report to Mr. McGlothlin.

John L. Jones, vice president–management information services, will report to Mr. Paul.

Denver Eyler, director, Rail-Highway Services, Atlanta, Ga., appointed general manager, Rail-Highway Services there, reporting to the vice president–operations.

Kenneth Askegren, district sales manager, Greensboro, N.C., appointed industrial development representative, Washington, D.C.

TORONTO, HAMILTON & BUFFALO.—Jack W. Harrison, assistant traffic manager–rates and divisions, Hamilton, Ont., appointed traffic manager, succeeding **J. K. Weston,** who retired March 31, after 50 years of service.

WESTERN PACIFIC.—G. R. Green, manager of economic and statistical analysis, promoted to director, economics and cost analysis.

OBITUARY

Charles H. Garn, 79, retired general passenger agent, **Nickel Plate** (now part of Norfolk & Western), Cleveland, died March 23 at his home in Bay Village, Ohio.

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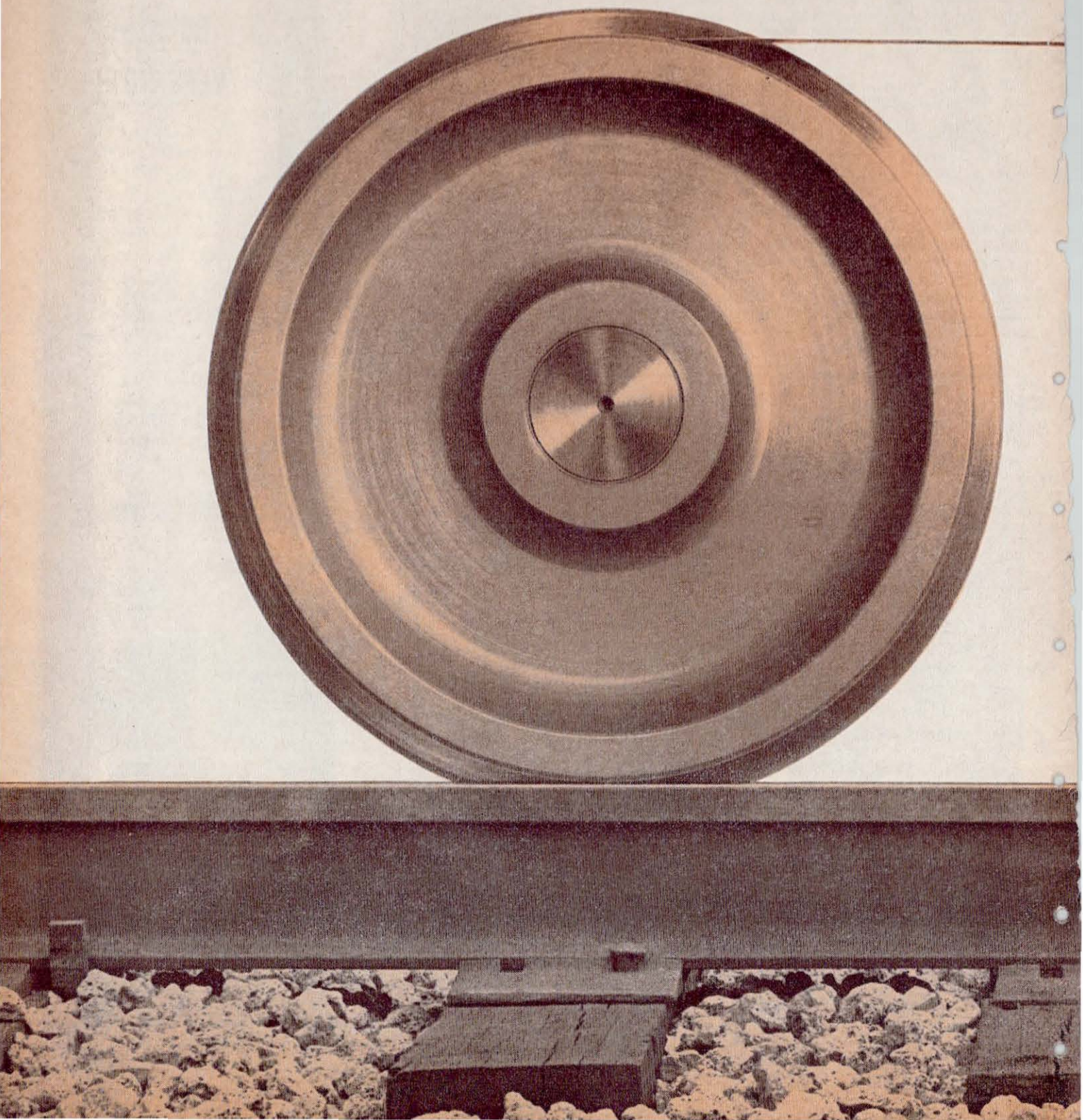
Circle 28 on coupon page 69

Westinghouse ran Boston's rapid transit trains through the computer... and came out with major savings in cost, power and weight.



The Massachusetts Bay Transportation Authority has purchased rapid transit cars for its new 9.5-mile South Shore Line to specifications established with the help of Westinghouse Train Simulation computer program.

The studies covered interconnecting lines as well as the new line. We assisted MBTA in reducing car weight, size of the propulsion system, power consumption and maintenance costs, with a minor change in requirements. Total savings in cost, power, weight and maintenance come to millions of dollars during the life of the fleet. Pullman-Standard has supplied 76 high-speed cars with Westinghouse Tracpak propulsion drives, controls and auxiliary power systems.

When you're planning a rapid transit system, let Westinghouse engineers supply the facts you need for a decision on optimum equipment specifications. We offer a full range of medium- and high-performance Tracpak propulsion units, auxiliary equipment and controls.

Call the Westinghouse transportation specialist in your area or write Westinghouse Electric Corporation, Transportation Division, Avenue A and West St., East Pittsburgh, Pa. 15112.

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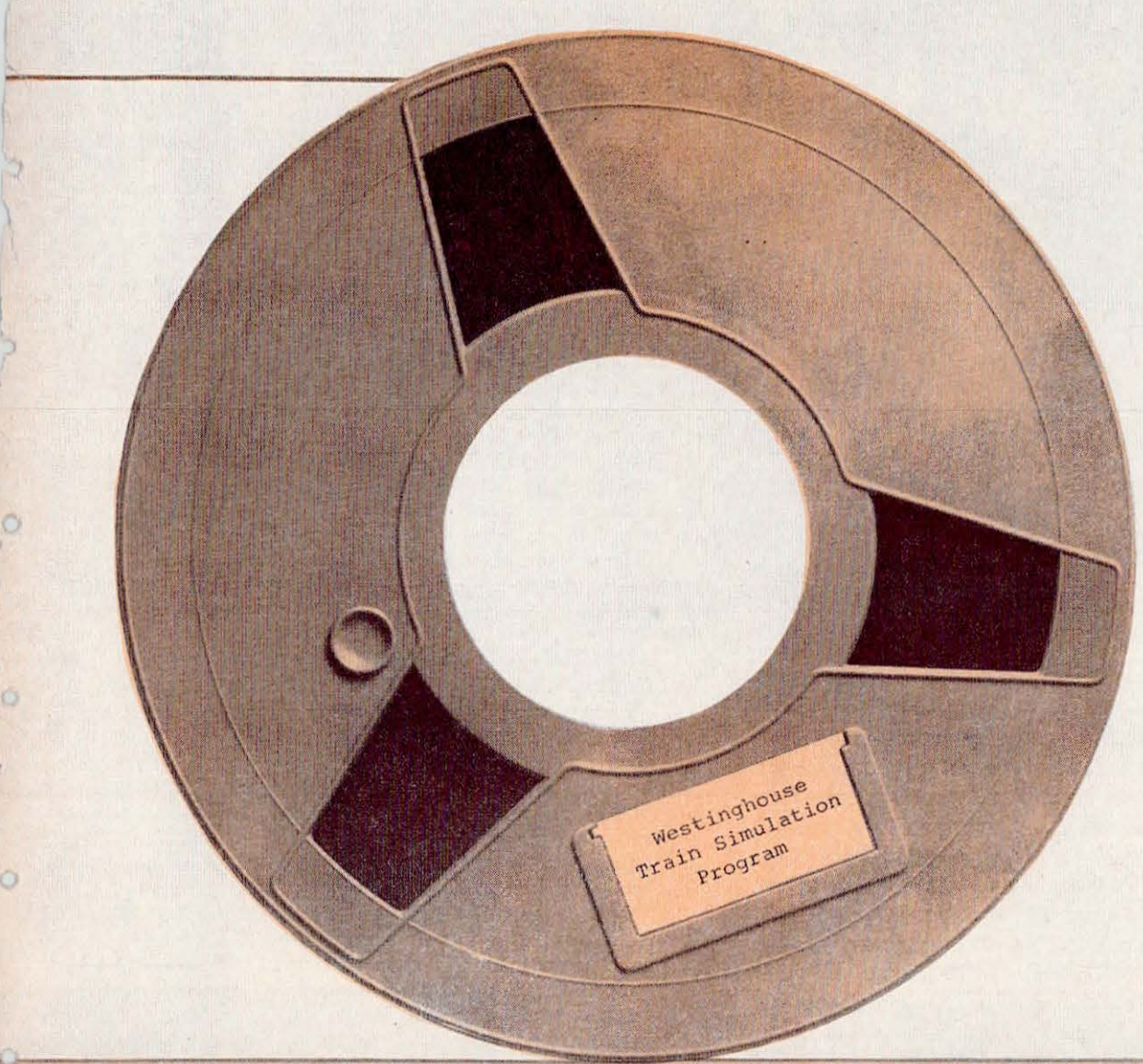

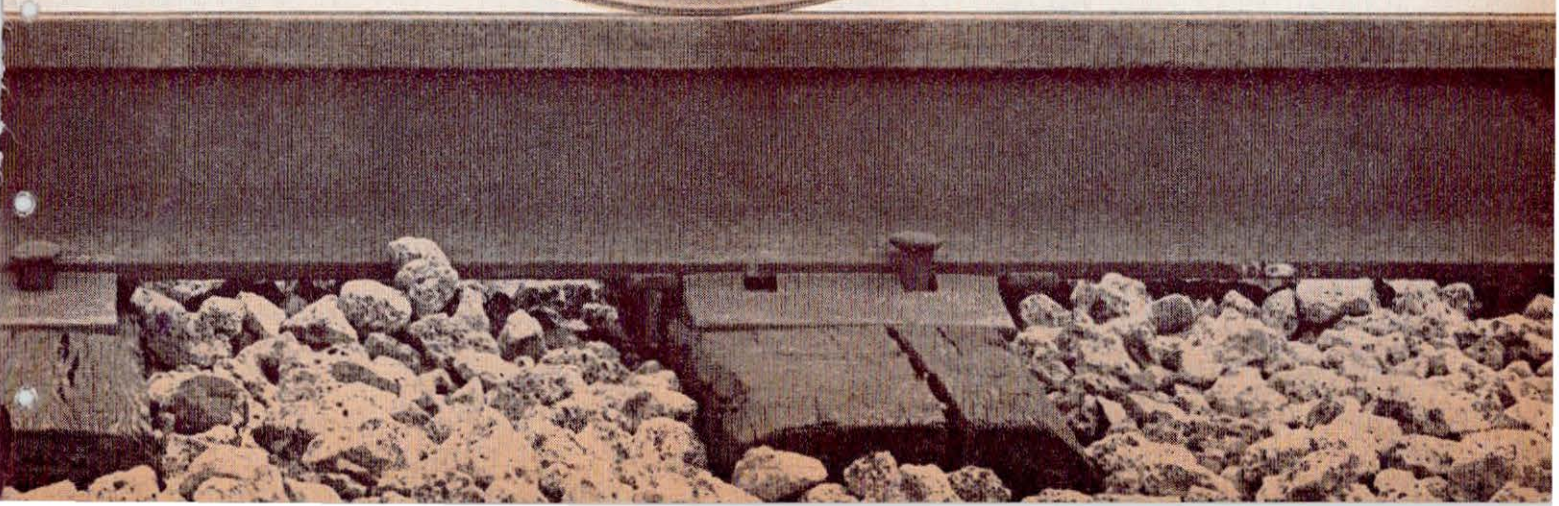

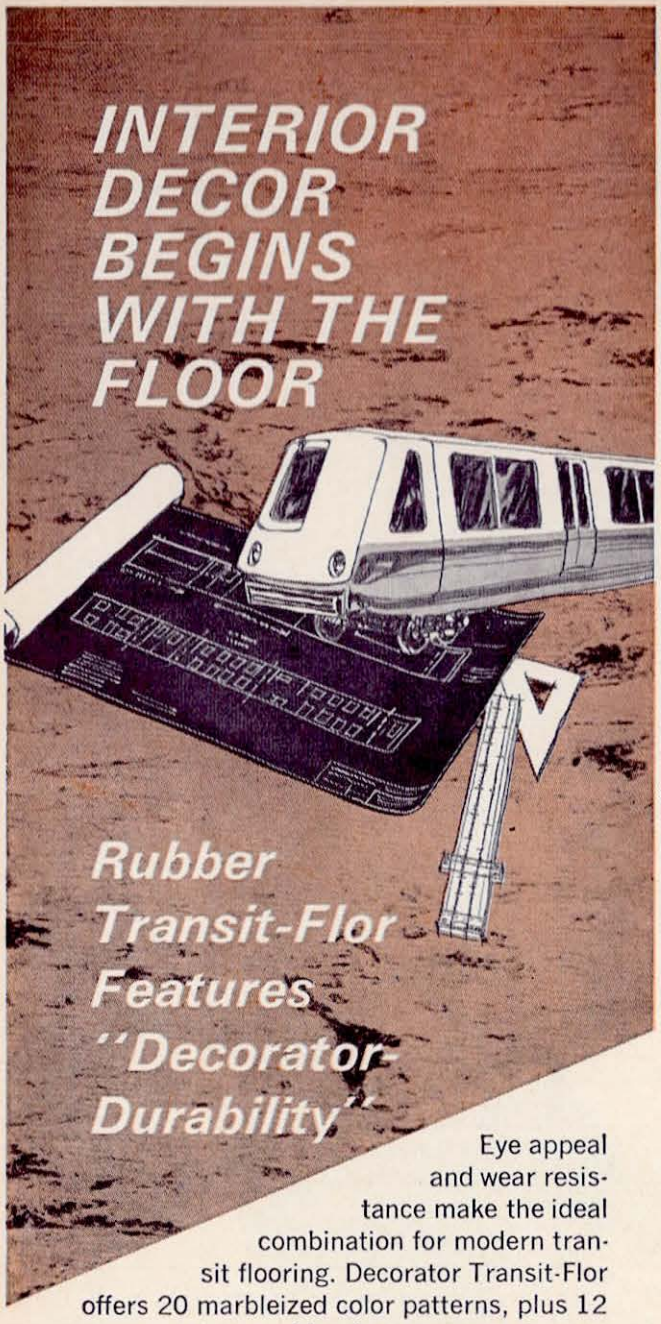

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The Leader in Rubber Transit Flooring & Step Treads

Circle 27 on coupon page 69

RAILWAY BOOKSHELF

CANADIAN NATIONAL STEAM POWER, by Anthony Clegg and Ray Corley. The problem of integrating three major and diverse locomotive fleets occurred between 1919 and 1923 as the Canadian National Railways was formed from the Canadian Northern, Canadian Government Railways, Grand Trunk Pacific, and Grand Trunk.

The newly merged property had motive power classification and numbering problems more complicated than those confronting recent U.S. mergers with their standardized diesel locomotive fleets. The precarious financial condition of its predecessors resulted in acquisition of numerous aged and outmoded locomotives. This forced Canadian National to embark on a locomotive-buying program, emphasizing designs "capable of negotiating less-than-ideal roadbeds."

Eight-coupled, dual-service locomotives (4-8-2s and 4-8-4s) became characteristic of CN; 286 were built between 1923 and 1944. The authors note that although "light by North American standards, the Canadian National's 4-8-4s were nonetheless well suited for the road's profile and traffic characteristics and handled 16-car passenger trains and 80-car freights with equal ease."

Steam ended on CN in 1960. The forty years of steam operation are summarized in an almost bewildering array of tables and photographs in this book. There is such attention to detail that the trends mirrored by locomotive acquisitions and retirements are sometimes obscured. The men responsible for these developments are ignored, with the exception of Sir Henry W. Thornton, chairman and president, from 1923 to 1933. In 1929 CN had one of the first multiple-unit diesel-electric road locomotives, but two decades would pass before the internal combustion engine was to make much of an impact on CN. *128 pages, tables, diagrams and photographs. Price: $12.95 in Canadian funds. Trains & Trolley, P.O. Box 1434, Station B. Montreal 2, Quebec.* **—Fred N. Houser**

ANALYSIS OF TRANSPORT TECHNOLOGY AND NETWORK STRUCTURE by Edward K. Morlock, Jr. The author, a member of the civil engineering faculty at Northwestern University and research associate at its Transportation Center, has developed a mathematical analysis for comparison of the various transport modes. While his effort was directed at defining the capabilities of the various common carriers for moving people, he feels it would be fairly easy to expand the analysis to freight transportation. Three modes were examined—vertical take-off and landing (VTOL) aircraft, high-speed trains, and buses. "We are interested," says the author, "in their relative resource use in producing similar levels of output." He concludes that "an efficient transportation system for a region as diverse in activity patterns and density as the Northeast Corridor is likely to be one that includes many different technologies." *143 pages, diagrams. Transportation Center, Northwestern University, Evanston, Ill.* **—F.N.H.**

RAILWAY DIRECTORY & YEAR BOOK. The 1969-1970 edition of this famed storehouse of information about railroads and allied subjects throughout the world marks its 75th year of publication. The contents have been extensively re-arranged to permit the inclusion of maps, which will be revised with each edition. Another change from previous editions is the incorporation of editorials supporting some of the sections, such as those on containerization, electrified railways, cybernetics and automation, and rapid transit. *Price: $11 (including postage). Temple Press, Ltd., 20-23 Greville Street, London, E. C. 1, England.*

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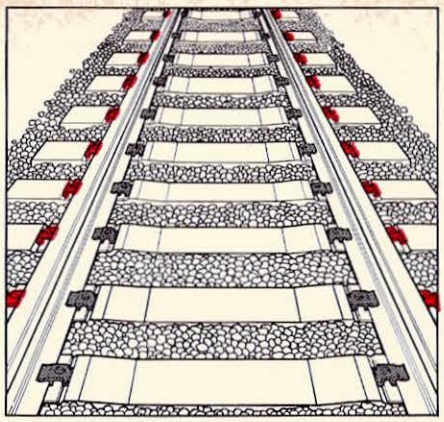

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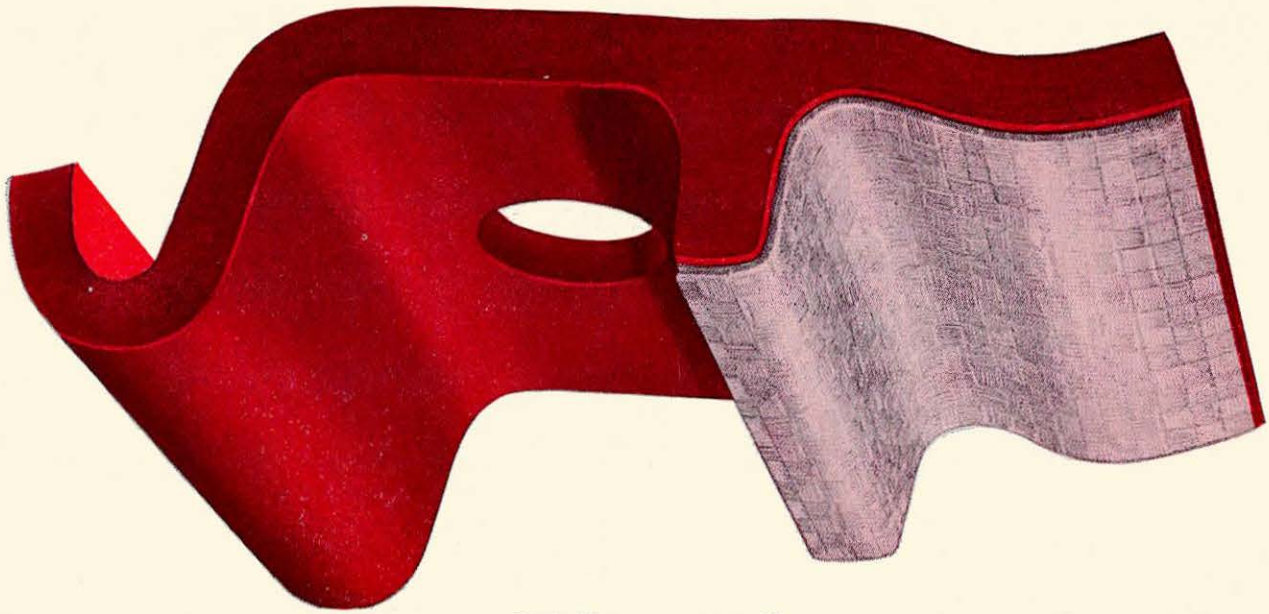
if you think you still have to mess with insulating pads, you're in for a shock.



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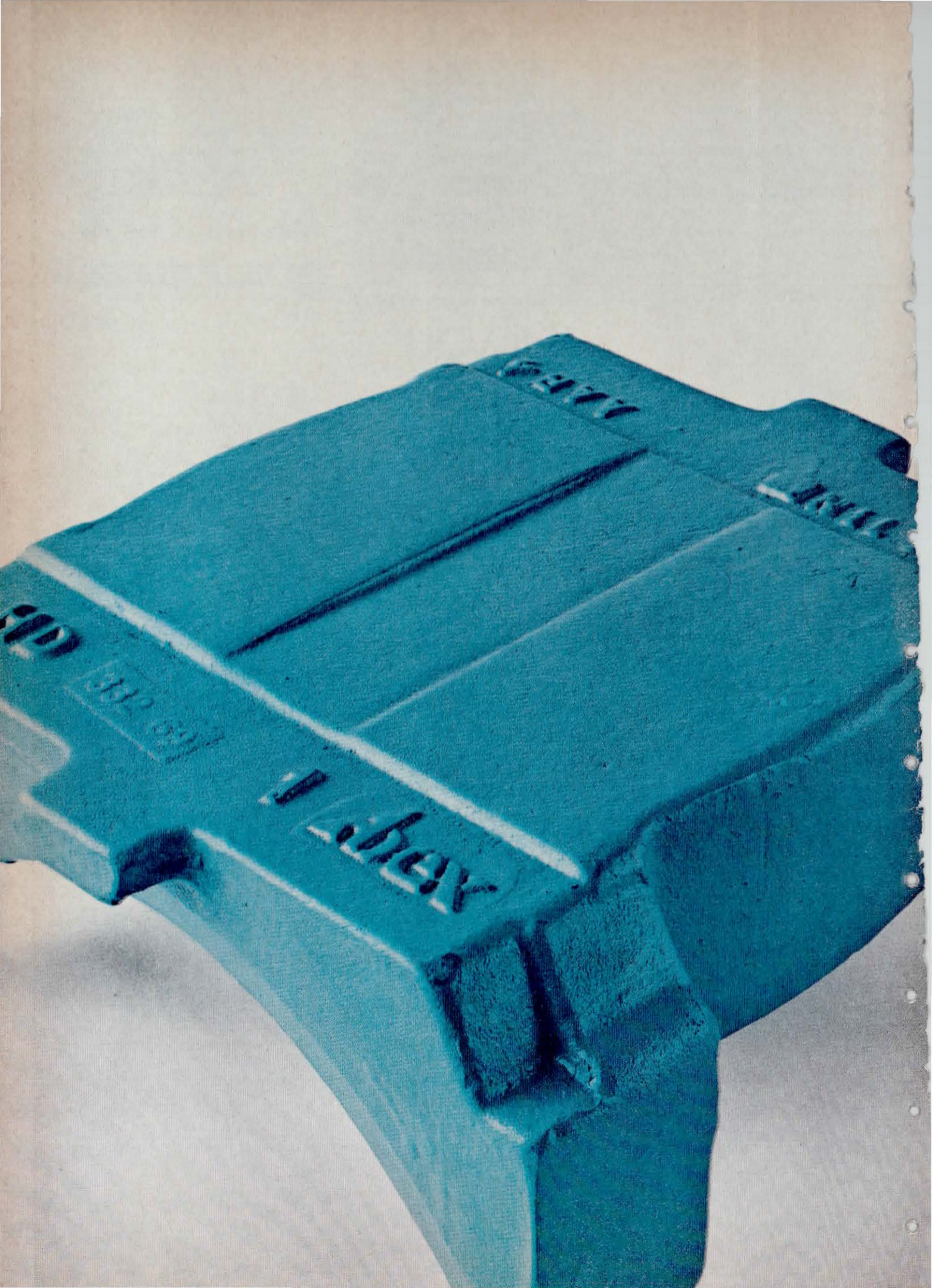

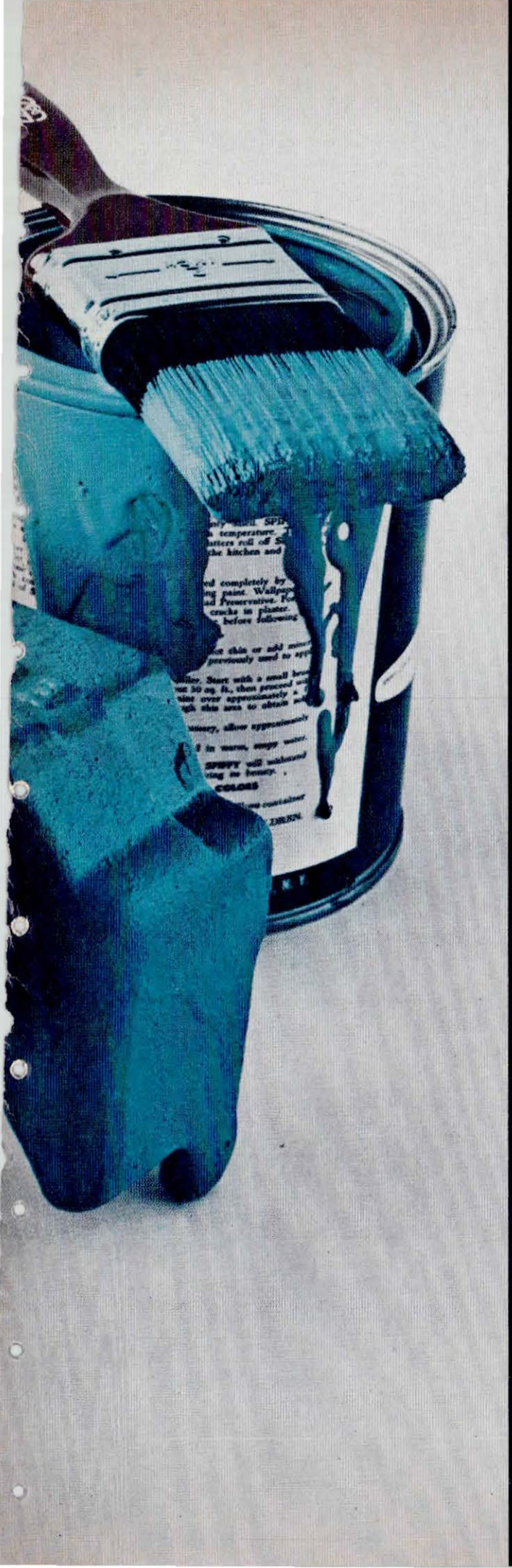

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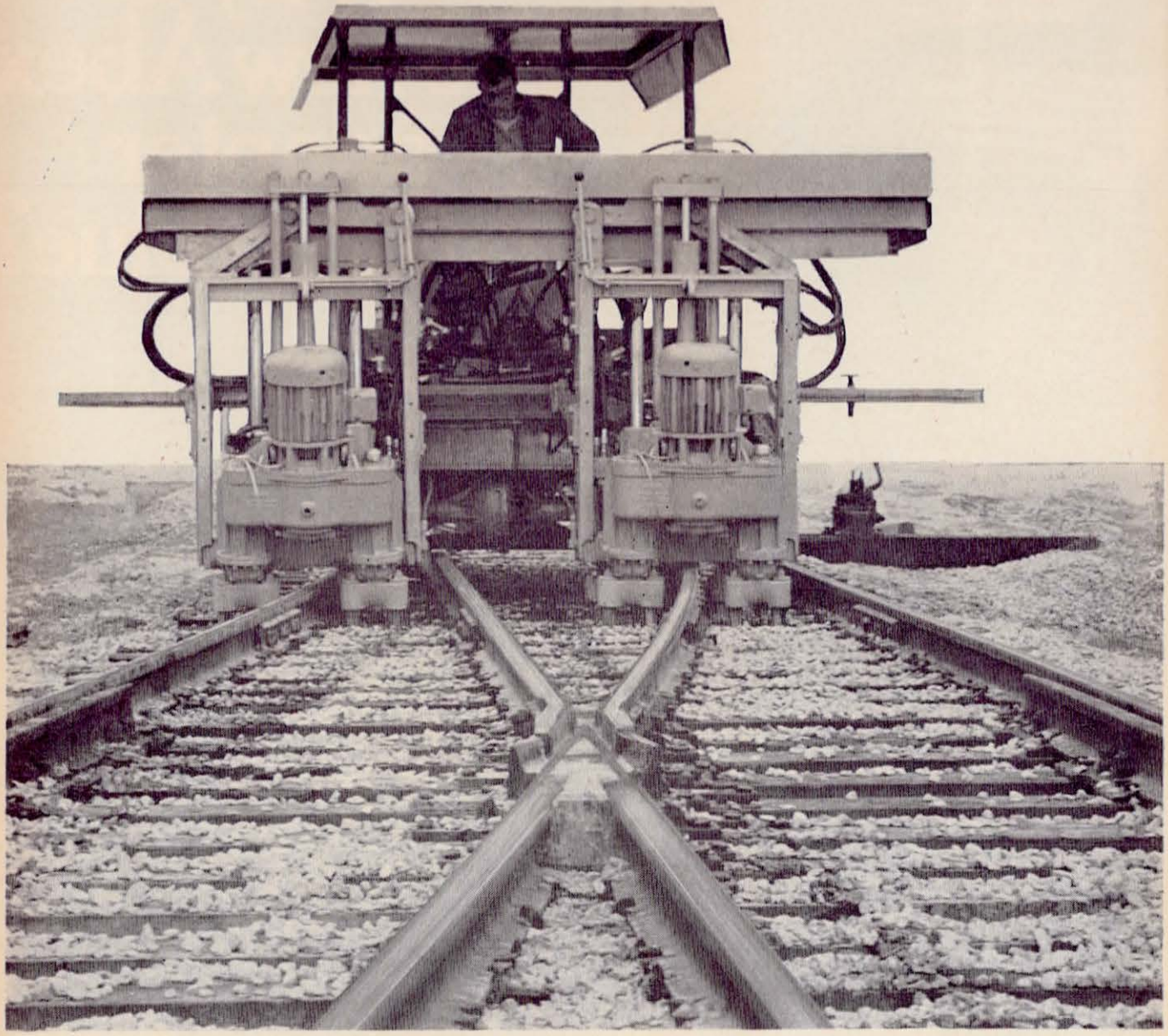

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It does everything the popular Junior Electromatic can do. And more! The TAMPER Switch Electromatic tamps the complete switch, turnout, crossover or ladder-track with 16 tools. At production tamper speed and pattern! Workheads can move laterally to give you higher, more uniform compaction. Another big advantage: it needs only one operator.

When you're not using it as a switch tamper, it doubles as a production tamper — for smoothing and spotting. And as a second machine in a tandem operation. The TAMPER Switch Electromatic is available with a pivoting frame to line the vibrators to the same degree as the turnout being tamped. So you get the same results as when you tamp a standard cross tie.

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MEMBER RPI

Market Outlook

CARLOADINGS

Loadings of revenue freight in the week ended April 4 totaled 497,263 cars, the Association of American Railroads announced on April 9. This was a decrease of 33,800 cars, or 6.4%, compared with the previous week; a decrease of 32,493 cars, or 6.1%, compared with the corresponding week last year; and a decrease of 24,881 cars, or 4.8%, compared with the equivalent 1968 week. Ton-miles generated by carloadings in the week ended April 4 are estimated at 14.3 billion, a decrease of 1.9% below the corresponding week of 1969, and 3.3% above the 1968 week.

REVENUE FREIGHT CARLOADINGS

Commodity	Mar. 28 week	Mar. 21 week
Grain	25,399	24,939
Farm products	12,521	13,501
Metallic ores	20,423	20,908
Coal	106,127	102,318
Crushed stone, gravel & Sand	24,339	23,525
Nonmetallic minerals	10,168	9,713
Grain mill products	18,868	19,464
Food & Kindred products	26,585	26,137
Primary forest products	24,580	24,748
Lumber & wood products (except furniture)	15,791	14,194
Pulp, paper & allied products	25,448	24,484
Chemicals & allied products	33,089	33,710
Petroleum products	9,891	10,342
Stone, clay & glass products	19,477	19,256
Coke	8,359	8,612
Metals & products	26,610	27,427
Motor vehicles & equipment	20,608	23,316
Waste & scrap materials	15,845	15,539
Forwarder & shipper assn. traffic	7,286	7,531
All other carloads	69,453	66,306
LCL traffic	1,277	1,534
Total cars loaded	522,144	517,504

CUMULATIVE TOTAL, 13 WEEKS	1970	1969	1968
	6,451,116	6,571,284	6,651,012
Estimated revenue ton-miles (billions) 13 weeks	186.0	184.6	181.8

PIGGYBACK CARLOADINGS

U. S. piggyback loadings for the week ended March 28 totaled 26,117 cars, carrying 45,094 trailers, compared with 27,360 cars, carrying 45,003 trailers, in the corresponding 1969 week. Loadings for 1970 up to March 28 totaled 319,358 cars, carrying 544,454 trailers, compared with 328,695 cars, carrying 538,952 trailers, in the corresponding period of 1969.

FREIGHT-TRAIN CARS

● *Trailer Train.*—Ordered 300 new cars as follows: from Bethlehem, 95 89-ft, 4-in. standard level cars; from Pullman-Standard, 105 68-ft bulkhead flats, and 100 89-ft, 4-in. standard levels. This brings TTX orders since Jan. 1 to 811 cars. As of March 30, Trailer Train had 55,641 cars in service or on order.

● *Orders and deliveries.*—Orders were placed for 3,632 new freight cars in February, compared with 2,032 in January and 3,650 in February 1969. In addition, 500 cars were ordered rebuilt in February, compared with 2,388 in the preceding month and 180 in February 1969. New cars on order and undelivered on March 1 totaled 40,704, compared with 44,201 on February 1 and 33,434 on March 1, 1969.

FREIGHT TRAIN CARS ORDERED AND DELIVERED AND BACKLOG OF ORDERS

DELIVERED

	Feb. 1970	Jan. 1970	Feb. 1969
Built New by carbuilders	4,859	3,484	4,439
Built new in R. R. shops	896	798	766
Built new—total	5,755	4,282	5,205
Rebuilt	487	542	699
Total Delivered	**6,242**	**4,824**	**5,904**

ORDERED

To be built new by carbuilders	3,236	2,032	3,145
To be built new in R. R. shops	396	0	505
To be built new—total	3,632	2,032	3,650
To be rebuilt	500	2,388	180
Total Ordered	**4,132**	**4,420**	**3,830**

ON ORDER AND UNDELIVERED

	March 1, 1979	Feb. 1,1970	March 1, 1969
To be built new by carbuilders	30,759	33,756	23,696
To be built new in R. R. shops	9,945	10,445	9,738
To be built new—total	40,704	44,201	33,434
To be rebuilt	5,445	5,432	3,696
Total on Order	**46,149**	**49,633**	**37,130**

LOCOMOTIVES

● *Pacific Great Eastern.*—Ordered five 3,000-hp diesel-electric locomotives from MLW-Worthington.

FOREIGN

● *Iran.*—The Export-Import Bank has authorized a $15.2-million loan to Iran to help finance the purchase, by the Iranian State Railways, of 51 Electro-Motive diesel-electric locomotives and related equipment. Each of the 3,000/3,300-hp locomotives will have six axles. The new purchases will increase the ISR fleet to 223 diesel-electrics, all supplied by EMD.

CAR OWNERSHIP

● *Serviceable cars.*—Revenue freight cars in serviceable condition owned by Class I railroads on March 1 totaled 1,354,438, compared with 1,378,477 on March 1, 1969, according to most recent AAR Car Service Division report. Estimated total ownership of all railroad- and privately-owned freight cars on March 1 was 1,786,881 (average capacity: 65.80 tons), compared with 1,794,677 (average capacity: 64.54 tons), on March 1, 1969.

ESTIMATED OWNERSHIP—ALL REVENUE FREIGHT CARS

(March 1, 1970 vs. March 1, 1969)

		Box	Covered Hopper	Gondola	Hopper	Flat	Refg.	All Others	TOTAL
Class I	1970	545,881	126,051	190,947	393,154	71,497	55,223	52,690	1,435,443
	1969	550,014	122,589	198,120	406,111	69,207	52,757	55,989	1,454,787
RRO&C Refgs.*	1970	0	0	0	0	0	45,096	0	45,096
	1969	0	0	0	0	0	46,320	0	46,320
All Other Private	1970	1,117	34,452	2,025	2,388	50,198	14,222	178,041	282,443
	1969	1,109	30,205	2,055	2,155	43,599	16,105	174,256	269,484
Class II & S&T Cos.†	1970	8,969	703	4,185	7,011	545	1,458	1,028	23,899
	1969	8,048	715	4,697	7,862	580	1,018	1,166	24,086
GRAND TOTAL	1970	555,967	161,206	197,157	402,553	122,240	115,999	231,759	1,786,881
	1969	559,171	153,509	204,872	416,128	113,386	116,200	231,411	1,794,677

* Railroad owned and controlled refrigerator car lines.
† Class II railroads and switching and terminal companies.

PASSENGER-TRAIN CARS

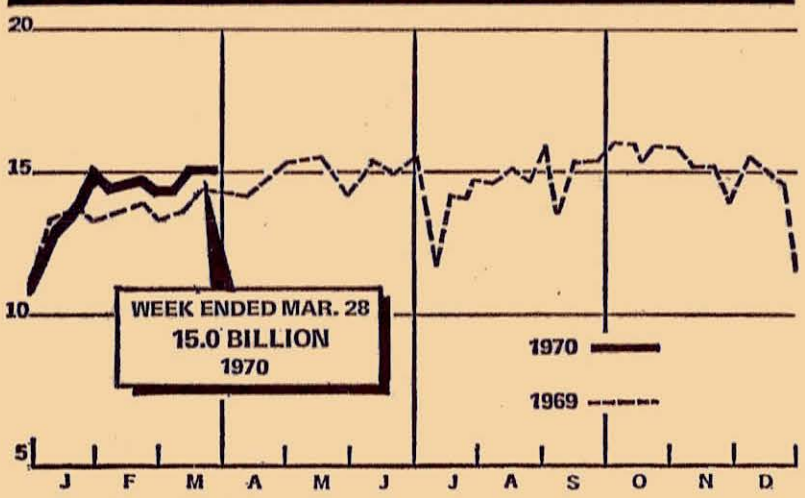
● *Port Authority Trans-Hudson.*—Will purchase 46 new air-conditioned coaches at an estimated cost of $9,460,000. Bids will be opened this month. The purchase will be financed entirely by the Port of New York Authority, which operates the PATH tubes connecting New York City with New Jersey. The order will bring PATH's fleet of air-conditioned equipment to 298 cars. The new cars, designated PA-3, may be built of aluminum, stainless steel, or high tensile low alloy steel, depending on the bid proposals. In exterior design they will be similar to the aluminum-body PA-1's and PA-2's delivered in 1965 and 1967. Interior seating is being modified to provide more room and reduce bottlenecks at doors.

Current Statistics

Net Income Class 1 Roads	
12 months, 1969	$570,000,000
12 months, 1968	511,000,000
New freight cars on order	
March 1, 1970	40,704
March 1, 1969	33,434
New freight cars delivered	
2 mos. 1970	10,037
2 mos. 1969	9,687
Serviceable cars	
March 1, 1970	1,354,438
March 1, 1969	1,378,477

RAIL FREIGHT TRAFFIC TRENDS

BILLION TON MILES (Estimated)



Source: Association of American Railroads

SHIPMENTS OF RAILROAD STEEL PRODUCTS

	January 1970 (net tons)	Change from January 1969	
		Per Cent	Net Tons
Rails, trackwork and equipment	89,876	+1.1	+961
Freight and passenger cars and locomotives	203,665	−5.7	−12,311
Street railways and rapid transit systems	3,072	−35.4	−1,683

Source: American Iron and Steel Institute.

NEW ORDERS FOR MACHINE TOOLS*

	February 1970 ($000)	February 1969 ($000)	2 mos 1970 ($000)	2 mos. 1969 ($000)
Metal cutting tools	62,200	93,150	154,450	184,350
Metal forming tools	29,300	45,700	51,600	82,000

MACHINE TOOL SHIPMENTS*

	February 1970 ($000)	February 1969 ($000)	2 mos. 1970 ($000)	2 mos. 1969 ($000)
Metal cutting tools	86,950	97,700	180,800	184,150
Metal forming tools	38,950	32,800	79,650	61,100

*Including foreign and domestic.
Source: National Machine Tool Builders' Association.

All statistics compiled, computed and formatted by TRADE*QUOTES Division of National Information Services, Inc. Cambridge, Mass. 02139

RAILWAY AGE Stock Report

TWO WEEKS ENDED MONDAY, APRIL 6, 1970

	PRICE: 1970 RANGE (1)	1 YEAR AGO	CLOSE APR 6 1970	2 WKS NET CHNG	2 WKS PCT CHNG	VOLUME: 2 WKS IN 00'S	LAST 2 WKS 00'S	AVGE IN 00'S (2)	INDEX: PRICE JAN 2 1970	CHNG TO DATE (1)	PCT CHNG
RAILROADS											
BURLINGTON NORTHERN	39- 41	N/A	40 1/4	+1 1/8	+2.8	2924	739	1103	40 5/8	0	-0.9
CHESAPEAKE & OHIO	52- 59	68 1/2	57	+2 1/2	+4.5	221	223	262	54 3/4	+2	+4.1
CHIC MILW ST.P & PAC	18- 20	45 1/4	19	+1 3/8	+7.8	729	229	521	16 3/8	+3	+16.0
CHIC, ROCK ISL & PAC	19- 22	28 7/8	21 1/4	0	0.0	41	59	48	19 3/4	+2	+7.5
DERECO PFD B	50- 61	68	61	+5 1/8	+9.1	43	57	45	53 3/4	+7	+13.4
GULF, MOBILE & OHIO	65-175	96 1/2	70	+ 1/2	+0.7	27	26	32	63 1/2	+7	+10.2
LOUISVILLE & NASHVLL	70- 74	85 3/4	71 1/4	+ 1/2	+0.7	112	161	95	71 1/4	0	0.0
MISSOURI PACIFIC A	63- 68	79 1/4	67	+1	+1.5	9	12	11	63 1/4	+4	+5.9
NORFOLK & WESTERN	78- 85	98 3/4	84 1/8	+3 3/4	+4.6	360	1958	673	83 1/2	+1	+0.7
READING CO	11- 17	19 1/8	13 1/4	+1 1/8	+9.2	62	77	127	12 1/4	+1	+8.1
ST LOUIS-SAN FRNCSCO	40- 45	50	43 1/8	-1 1/8	-2.5	66	96	107	40 3/8	+3	+6.8
SOO LINE	25- 31	38 1/2	29 3/4	- 1/4	-0.8	28	62	53	27 1/4	+3	+9.1
SOUTHERN	44- 50	59 1/2	48 3/4	+ 7/8	+1.8	602	781	475	46 3/4	+2	+4.2
WESTERN PACIFIC	15- 23	37 3/8	20 5/8	+3 5/8	+21.3	250	349	341	19 1/2	+1	+5.7
DIVERSIFIED COMPANIES											
CANADIAN PACIFIC	62- 75	82	63 1/2	-1	-1.5	103	548	181	73 1/2	-10	-13.6
ILLINOIS CENTRAL IND	26- 31	39	29 7/8	+ 1/2	+1.7	285	249	911	30 5/8	-1	-2.4
KATY INDUSTRIES	10- 14	21 3/4	11 1/8	- 3/4	-6.3	160	160	300	10 5/8	+1	+4.7
NORTHWEST INDUSTRIES	12- 17	27 1/4	16 1/4	+2 3/4	+20.3	1692	627	1611	13 3/4	+3	+18.1
PENN CENTRAL CO	23- 35	53 3/4	23 1/8	- 3/8	-1.5	1814	1584	2352	29 1/2	-6	-21.6
RIO GRANDE INDUST	11- 14	N/A	12 1/4	+ 1/4	+2.0	198	172	166	11 3/4	+1	+4.2
SANTA FE INDUSTRIES	23- 26	32 1/2	25 7/8	+2	+8.3	2021	1915	1580	25	+1	+3.5
SOUTHERN PACIFIC CO	31- 37	40 3/8	35	+ 3/4	+2.1	1931	792	1166	33 1/4	+2	+5.2
UNION PACIFIC CORP	40- 48	N/A	44 3/8	+2 1/2	+5.9	1378	507	814	46	-2	-3.5
MOTOR CARRIERS											
ASSOCIATED TRANSPORT	9- 12	17 7/8	9	- 1/8	-1.3	83	45	87	11 3/4	-3	-23.4
CONSOL FREIGHTWAYS	24- 31	35 1/2	30 3/4	+2 3/8	+8.3	748	883	727	28 1/2	+2	+7.8
MC LEAN TRUCKING CO	33- 45	51 1/2	41 7/8	+1 7/8	+4.6	48	122	162	44 3/8	-3	-5.6
OVERNITE TRANSPORT'N	18- 23	26 1/2	21 1/4	- 3/8	-1.7	131	127	85	18 5/8	+3	+14.0
PAC INTERMTN EXPRESS	12- 16	29	16	+1 1/2	+10.3	193	74	181	15 3/4	0	+1.5
ROADWAY EXPRESS	20- 27	26 3/4	25 1/4	+2 3/4	+12.2	(3)	-	-	26 1/2	-1	-4.7
TRANSCON LINES	9- 13	19	12 1/4	- 3/8	-2.9	425	511	519	11 1/2	+1	+6.5
YELLOW FRGHT SYSTEM	22- 27	29	26 1/4	- 1/4	-0.9	(3)	-	-	25 1/2	+1	+2.9
AIRLINES											
AMERICAN AIRLINES	21- 31	35 3/8	26 3/8	0	0.0	2833	1536	4748	31	-5	-14.9
DELTA AIR LINES	27- 35	37 1/2	32	- 7/8	-2.6	1896	1179	1919	30 3/4	+1	+4.0
EASTERN AIR LINES	12- 19	24 1/8	16 7/8	+ 1/4	+1.5	2105	3372	3004	15 1/2	+1	+8.8
TRANS WORLD AIRLINES	17- 26	38 1/4	16 3/4	-1 1/8	-6.2	6126	1308	2696	23 7/8	-7	-29.8
UAL INC (UNITED)	20- 28	36 1/2	23	- 1/8	-0.5	1381	1276	2524	28	-5	-17.8

ALL BUT TWO OF THE ABOVE SECURITIES ARE LISTED ON THE NEW YORK STOCK EXCHANGE; ROADWAY EXPRESS AND YELLOW FREIGHT SYSTEM ARE TRADED OVER-THE-COUNTER.

(1) TO NEAREST DOLLAR
(2) AVERAGE TWO-WEEK TRADING VOLUME SINCE JANUARY 1, 1970
(3) VOLUME IS NOT REPORTED FOR OVER-THE-COUNTER ISSUES

SUPPLY TRADE

Robert S. Lawson, a senior vice president, **American Export Industries,** New York, has been named president of **Inter-Freight, Inc.,** which has been formed to provide a wide range of domestic and international transport services by rail, road and ship under single carrier responsibility. Inter-Freight will integrate the freight services of both AEI-owned carriers and independent carriers to offer shippers a transportation "package."

Warren R. Walworth has been elected vice president of **Robert Heller Associates,** New York. Mr. Walworth has served as consultant in organization planning and manpower development to industrial, governmental and transportation organizations, particularly railroads, for which he conducts seminars on improved marketing and sales techniques. Mr. Walworth served the New York Central System (now Penn Central) for 27 years in various operational, marketing and management positions.

George H. Jones, Jr., has been elected assistant vice president of Robert Heller Associates. Mr. Jones served in personnel administration positions, such as manager of organization planning and director of management training for a major railway system, prior to entering the consulting field.

Carl Knispel has been named manager of engineering technical services, **Keystone Railway Equipment Co.**

Robert S. Lawson
Inter-Freight

Warren R. Walworth
Robert Heller Assoc.

George H. Jones, Jr.
Robert Heller Assoc.

Carl Knispel
Keystone

The Signal & Communications Division of **Westinghouse Air Brake Co,.** Pittsburgh, Pa., has appointed three group managers: **D. D. Huffman,** project engineering; **H. L. Hathaway,** systems planning and analysis, and **L. K. Hedding,** engineering services. **A. J. Carey** has been appointed section manager, railroad control, Project Engineering Group, and **C. W. Gilbert** has been named section manager, systems planning.

The Western Region sales office, **Magor Railcar Division, Fruehauf Corp.** is now located at 224 S. Michigan Ave., Chicago.

Philip J. Gasparac, Jr. has been named to the newly created position of director of management information systems, **Vapor Corp.** Mr. Gasparac was formerly management consultant, **Price Waterhouse & Co.**

British Insulated Callender's Construction Co., Ltd., Thornton Heath, near London, England, wholly owned subsidiary of **British Insulated Callender's Cables, Ltd.,** has opened an office in Chicago to deal specifically with overhead catenary systems for the electrification of railroads in North America. **T. B. Bamford** has been appointed resident traction representative and may be contacted via Burndy Midwest, Inc., 9420 River Street, Schiller Park, Ill. 60176.

Donovan S. Thayer has been elected president of a newly formed Equipment Leasing Division, **ITEL Corp.,** at Crocker Plaza, San Francisco. The division will arrange leases for transportation equipment.

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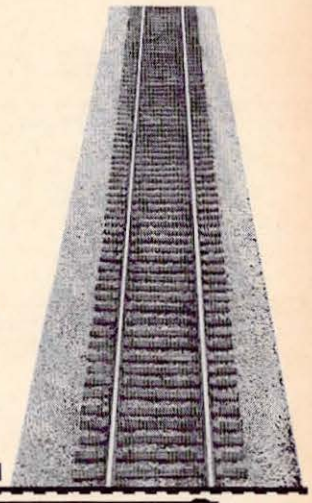

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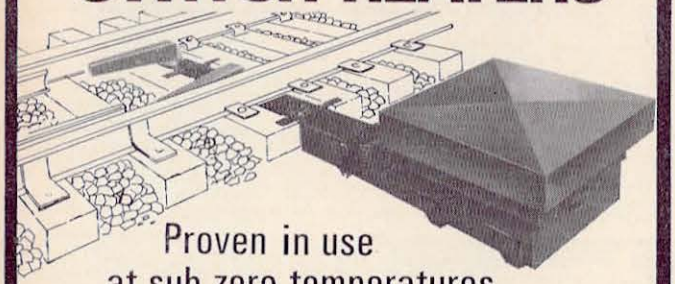

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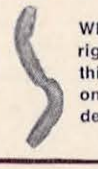

Wheels hitting a rigid Stop started this center-pin on its way to destruction

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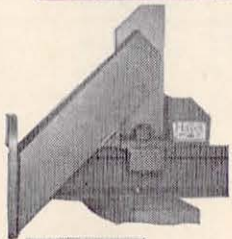

Type SF (two identical blocks like one at left) cushions the impact by controlled friction. At slow approach, wheels ease Stop blocks gently against tie in cushioning ballast. At higher speeds, wheels force blocks down on rail, adding friction braking to cushion.

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Viewpoint

Can government solve railroad problems?

When you stop to ponder the needs of tomorrow's railroads, you find that a lot of them appear as figures preceded by dollar signs. Then you run into trouble—because there is little agreement on either the figures themselves or the means of obtaining the dollars they represent.

Take, for instance, the matter of freight-car supply. Some say railroads should be spending double what they now spend, to add equipment to the fleet and to replace aging units. Others argue that the industry has enough cars, if only they were properly utilized—and this argument carries with it the theory that a little bit of car-shortage is a good thing, because it encourages people to make better use of cars. Government, presumably, is interested in improved transportation, in improved freight-car supply. Yet it was government, through the ICC, which jury-rigged a car-hire formula that appears to penalize efficient utilization.

Or take, for instance, the matter of track and roadway improvement. Railroads are now spending at a rate of about $2 billion a year on the fixed plant—divided roughly 75% for maintenance and 25% for capital improvement. Hardly anybody thinks this is enough. But how much *is* enough? Should maintenance expense be jacked up by 50% and capital spending at least doubled? As much to the point, is there a better way of calculating return-on-investment for fixed-plant improvement which will make its importance stand out more clearly?

There's been no shortage of ideas for financing car-fleet growth. A decade or so ago, the industry was abuzz with discussion of the so-called Symes Plan which involved government aid and the Relco (Railway Equipment Leasing Co.) plan which was strictly private-enterprise. Just in recent weeks, several top railroaders—among them Rock Island's Jervis Langdon and Frisco's Dick Grayson—have called for a new look at the car-pool principle. Something positive may well evolve out of one or another of these ideas.

Unfortunately, however, there has been no outpouring of ideas on financing fixed-plant betterments. True, there have been efforts to work out a depreciation plan for fixed plant. Former Western Maryland President Arthur Grotz has reintroduced his proposal for government involvement on a sale-and-leaseback basis. But in the main, railroads have been forced to fight this battle on a kind of attrition basis—finding machines that will do better work more cheaply, abandoning non-paying branch lines, closing ancient and little-used yards.

Now, in both areas—equipment and plant—railroads are faced with the threat of government-imposed "standards." The implication is that government will be telling railroads what to do—without lending any kind of helping hand to the doing.

The railroad industry has seldom been kind to "messiahs" in its midst. But just this one problem today—government involvement in railroad improvement—may demand messianic solution, either on an individual or a group-think basis. Otherwise, government may well solve one problem by creating 10 new ones.

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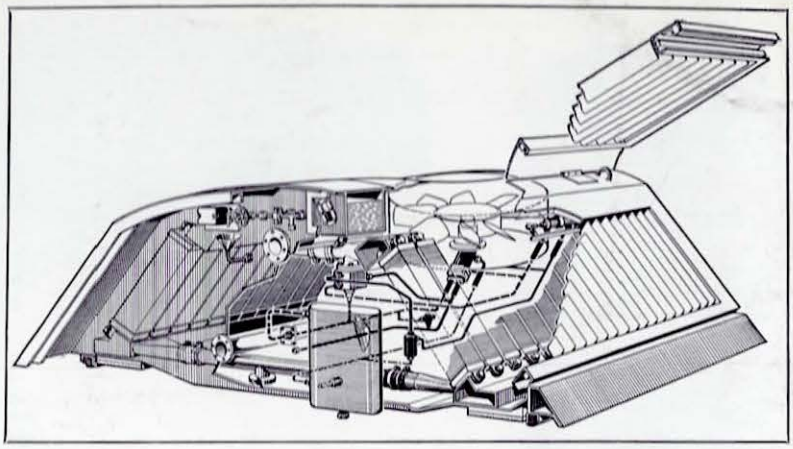

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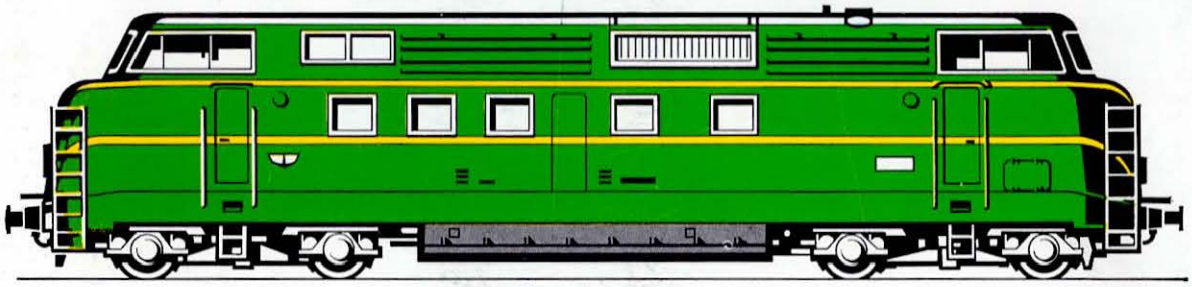

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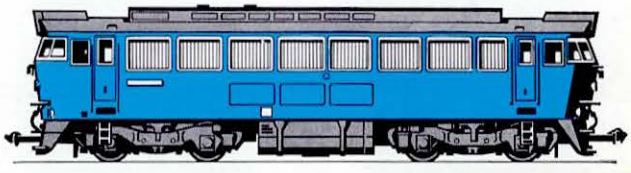
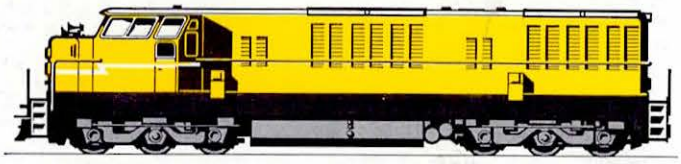
. . . in Malaysia . . . . . ➧





➧ . . . . . in Brazil . . .

. . . in Spain . . . . . ➧

BEHR

⬌ . . . . . Throughout the world . . .

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